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Alternative Transportation Modes
Feasibility Study
Volume IV

Executive Summary

YOSEMITE
National Park • California

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Alternative Transportation Modes
Feasibility Study
Volume IV

Executive Summary
June 1994

YOSEMITE
National Park • California

United States Department of the Interior • National Park Service • Denver Service Center
Prepared by BRW, Inc., in association with Dames & Moore

B

This study has been prepared by BRW, Inc. and Dames and Moore under the direction of the Branch of Transportation, Denver Service Center, National Park Service. The study has been reviewed by the National Park Service and the U.S. Department of Transportation. Appropriate changes have been incorporated based on these reviews. NPS staff have provided assistance, review, and guidance during the course of the study. Special thanks are extended to the staff of Yosemite National Park for their assistance in collecting and assembling data. The staff of the Yosemite Park and Curry Company are also recognized for their contributions to the study.

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PURPOSE

Section 1050 of the Intermodal Surface Transportation Efficiency Act of 1991, Public Law 102-240, requested that a study be conducted of alternatives for visitor transportation in the national park system. Because of congressional intent and interest, the study used Denali National Park and Preserve, and Yellowstone and Yosemite national parks as case study examples. Each of these park units has special transportation problems.

The major purpose of this study, as stated in the 1991 act, is to evaluate the following:

> 1. The economic and technical feasibility, environmental effects, projected costs, and benefits as compared to the costs and benefits of existing transportation systems, and general suitability of transportation modes that would provide efficient and environmentally sound ingress to and egress from National Park lands; and
>
> 2. Methods to obtain private capital for the construction of such transportation modes and related infrastructure.

The study included an evaluation of specific alternatives to private vehicle travel in each of the three parks and a comprehensive inventory of transportation technologies that can serve visitor transportation needs within the national park system.

Transportation problems in the national park system are a cause for increasing concern. The issues leading to this study included the following:

- increasing traffic congestion in many park units, indicating a need for alternative transportation modes to enhance resource protection
- potential enhancement of the visitor experience and reduced vehicular congestion with the increased use of visitor transportation systems
- increasing rates of deterioration of park roads from increased traffic and age
- rapidly expanding roadway construction needs

The information presented in this study is intended for use in the conceptual development and evaluation of transportation alternatives in Yosemite National Park. It provides a preliminary assessment of the feasibility of visitor transportation system options in the park. The study is not intended to produce a recommended alternative for visitor transportation. More in-depth engineering and environmental impact analyses of specific conditions will be required to confirm the cost estimates presented here and to conform to the National Environmental Policy Act and other legislative requirements for proposed improvements in units of the national park system.

PREFACE

The *Alternative Transportation Modes Feasibility Study* is presented in four separate volumes. This volume, Volume IV, presents the findings of the feasibility study for Yosemite National Park, located in east-central California. Volume I provides an overview of transportation planning for national parks and an inventory of alternatives to private vehicle travel within parks. Volumes II and III present the results of evaluations of alternative transportation systems for Denali National Park and Preserve and Yellowstone National Park, respectively.

Throughout the *Alternative Transportation Modes Feasibility Study*, only those transportation technologies that have been proven in everyday use have been evaluated in detail. Volume I identifies emerging technologies that show the greatest promise for future application in the national park system. As these and other new technologies are developed and proven, a broader range of options may be available for use in park units.

The study has concentrated on transportation within and near Yosemite. The transportation of visitors to recreation sites from remote locations was not considered directly during this study. However, the National Park Service (NPS) recognizes the value of integrating the planning of transportation systems within the parks with the efforts of surrounding communities to address transportation issues. Visitor transportation systems in the parks must respond to transportation requirements that will vary depending on visitors' means of traveling to parks.

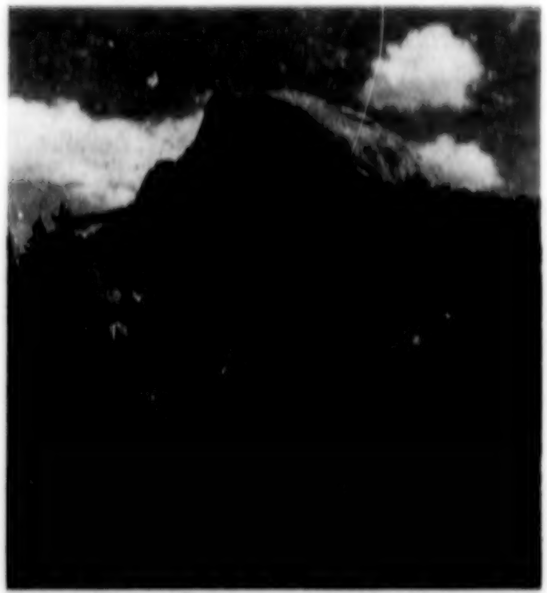
Undoubtedly, many opportunities will be available to enhance the economic development potential of gateway communities and to reduce the impacts of transportation on park resources by providing innovative transportation systems based in the gateway communities. Such systems could be extensions of or complements to internal visitor transportation systems. A cooperative approach to visitor access and internal park transportation could enhance efforts to preserve regional ecosystems while improving the overall quality of visitors' experiences in national parks.

The movement of visitors to and between attractions within parks accounts for the majority of travel within the national park system. Consequently, the resources available for this study have been concentrated on the question of how best to serve the transportation needs of visitors. Frequently, the transportation of NPS and concessioner employees is also an issue, especially at the larger park units. Specific planning efforts in each park unit should explore the opportunity to address both visitor and employee transportation needs with alternative transportation systems. The ability to serve both groups of travelers with a single system will depend on the location of employee housing, an issue which is outside the scope of this study.

Transportation planning for parks is but one element of a complete and systematic planning process that is conducted to determine the future of the nationally significant areas that have been set aside as units of the national park system. As urban planning professionals have recognized that effective land use and transportation decisions cannot be made independently, recreation and park planners and managers have increasingly embraced the idea of coordinated planning for resource management, visitor facilities, and transportation systems.

Transportation systems in national parks play a crucial role in determining the quality of visitors' experiences in the parks and have a strong influence on resource preservation. In developing transportation alternatives for Yosemite and other units of the national park system, management and staff should consider how those alternatives can best support the broader purpose and values of the National Park Service and the individual park.

EXECUTIVE SUMMARY



Yosemite National Park is characterized by unique geologic formations and pristine wilderness areas.

Yosemite is internationally recognized for its spectacular granite walls, waterfalls, clear streams, unique forest habitats, and biological diversity. The 1,200 square mile park contains 600 lakes, 1,300 miles of streams, 800 miles of trails, 350 miles of roads, and 2,000 campsites. The park is one of the crown jewels of the national park system and has an important place in the history of the conservation movement in the United States. Scenic beauty and access to pristine wilderness areas are among the most significant assets of Yosemite. It was designated a world heritage site in 1984.

Transportation to and within the park has been a source of conflict and controversy over most of Yosemite's history. Automobiles were banned from the park between 1907 and 1913. After 67 years of private vehicular access, and in response to the undesirable impacts associated with spiralling growth in traffic volumes and an ever-increasing demand for parking, the 1980 Yosemite General Management Plan (GMP) stated:

> Increasing automobile traffic is the single greatest threat to enjoyment of the natural and scenic qualities of Yosemite. . . . The ultimate goal of the National Park Service is to remove all private vehicles from Yosemite Valley. The Valley must be freed from the noise, the smell, the glare and the environmental degradation caused by thousands of vehicles.

Several planning efforts have suggested ways to reduce the influence of private vehicles in Yosemite Valley since the general management plan was written 13 years ago. Meanwhile, two other areas of the park have experienced substantial growth in visitation, resulting in congested conditions and an increasingly urban character of visitor experience.

The Mariposa Grove of giant sequoia trees, near Yosemite's south entrance; and Tuolumne Meadows, near the east entrance, now experience parking shortages and traffic conflicts on a daily basis. Visitor transportation systems are operated by the Yosemite concessioner under the management of the National Park Service (NPS) in Yosemite Valley, the Mariposa Grove/Wawona area, and Tuolumne Meadows.

Traffic impacts have always been a source of concern.

These systems have helped meet visitor transportation needs in these areas, but increasing delays from vehicular traffic, and inadequate parking facilities for access to the transportation systems have limited their effectiveness. This Alternative Modes Feasibility Study examined opportunities to improve visitor transportation system (VTS) service in each of these major activity areas within Yosemite National Park. The study also evaluated alternative strategies to intercept private vehicle trips bound for Yosemite Valley at remote locations within the park and outside the park boundaries.

VISITATION

Visitation to Yosemite has increased steadily over the last decade. In 1981, the number of recreation visitors to Yosemite was 2.5 million. Through the 1980s, visitation increased at an average of 3.1% per year to reach more than 3.4 million in 1991. Visitation to Yosemite totalled nearly four million in 1992. A strong seasonal visitor pattern is evident at Yosemite, as shown in figure ES-1; with low visitation in the winter, very high visitation in the peak months of July and August, and moderate visitation in the spring and fall shoulder months. Monthly visitation totalled more than 600,000 in both August 1991 and August 1992. Forecasts of future visitation indicate that visitation growth will occur primarily in the shoulder season, with the maximum monthly visitation remaining at about 600,000.

Nearly all of the recent growth in visitation at the park is associated with increasing day use. In 1981, day users accounted for 15% of all park visitation. By 1991, 37% of visitors were making day trips into and out of the park. The concession services plan and the general management plan call for a reduction in overnight lodging and camping facilities in the park. Since overnight lodging and camping accommodations are nearly fully occupied on a year-round basis, day use trips will continue to account for nearly all of the growth in travel to Yosemite.

The general management plan established maximum daily visitation levels for each of the activity areas in the park. Limits, based on the estimated carrying capacity of visitor facilities were defined for day use and overnight visitation, as shown in table ES-1. These daily visitation limits were used to define the peak requirements for the VTS alternatives evaluated in this study. On the busiest summer weekends, traffic counts and parking occupancy studies conducted in 1992 indicated that visitation at Yosemite had reached the prescribed limits, affording further evidence that future visitation increases will result from growth in off-peak attendance.

The travel patterns of visitors within Yosemite have a significant influence on the viability of VTS alternatives. Over 60% of visitors travel to Yosemite as part of a larger vacation itinerary. Many of the trips made by these visitors enter the park at one location and leave at a different location. Visitor surveys indicate that 70% of all Yosemite visitors travel to Yosemite Valley for a portion of their stay in the park. More in-depth data on the travel patterns of visitors was collected over a 6 day period from August 12 through August 17 1993, including weekdays and weekend days. From this data it was determined that 57% of all visitors enter and leave the park via different entrance stations and that 50% of all visitors to Yosemite Valley also travel to one of the other major activity areas within the park. Only 21% of the Yosemite Valley visitors contacted during the survey period visited the valley only and entered and exited the park through the same entrance station. Figure ES-2 shows the overall visitation patterns of Yosemite Visitors.

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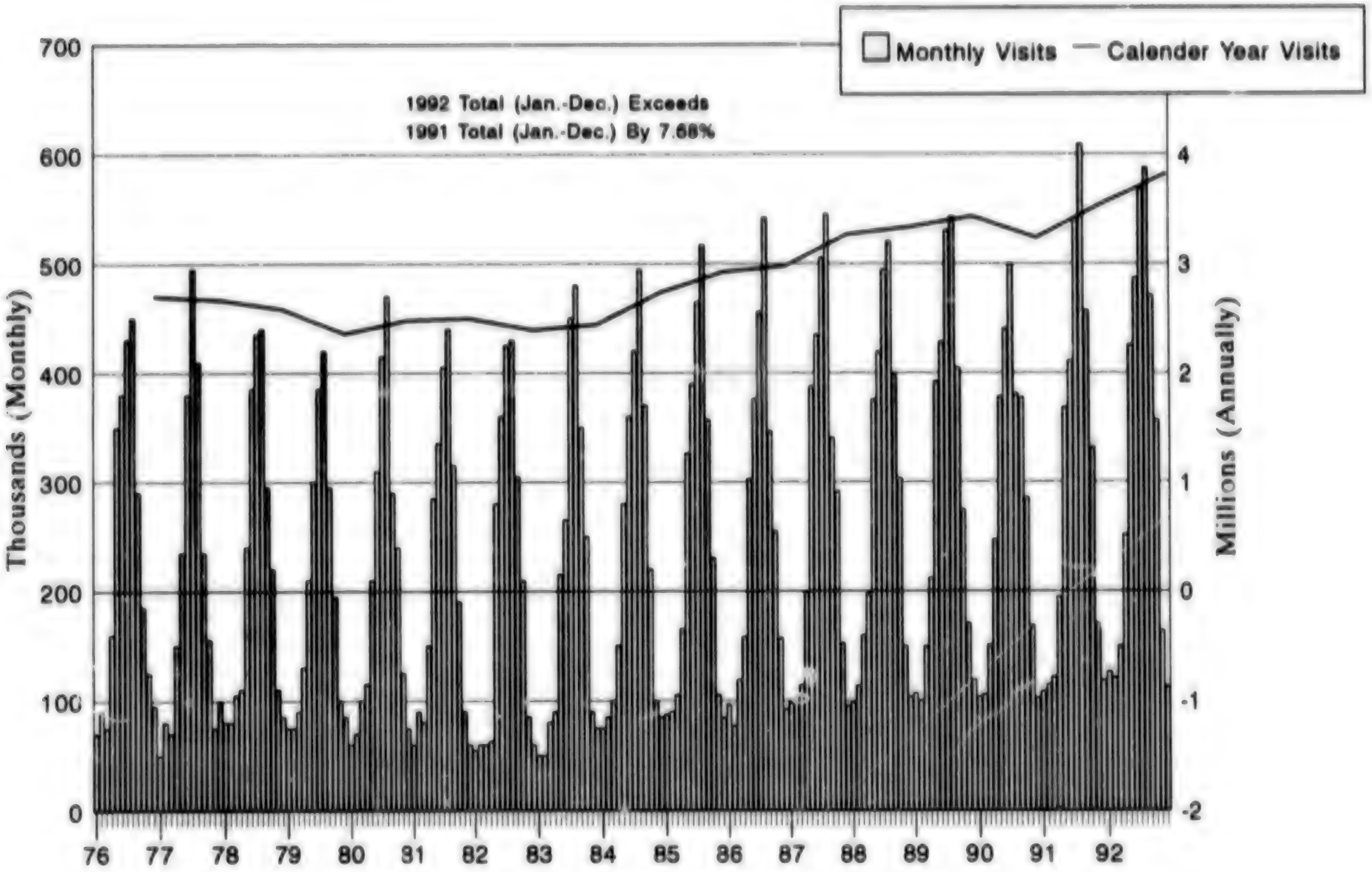
Figure ES-1: Yosemite National Park

Yosemite Monthly and Annual Visitation



SOURCE: Yosemite staff, Yosemite Transportation Strategy
(Prepared By The Wilderness Society, 1992)

Figure ES-2: Yosemite National Park
Visitor Travel Patterns

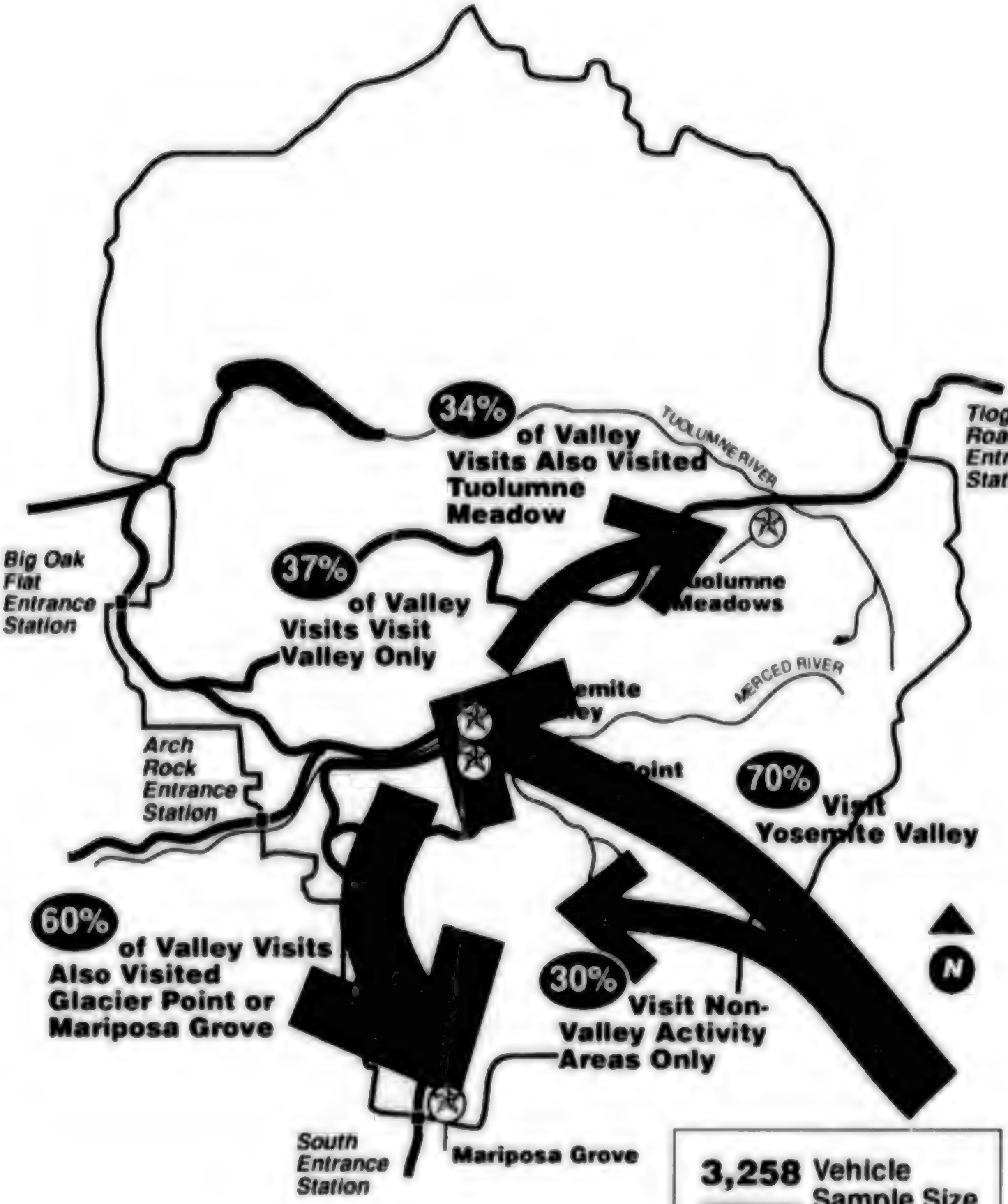

34%
of Valley Visits Also Visited Tuolumne Meadow
TUOLUMNE RIVER
Tioga Road Entrance Station
37%
of Valley Visits Visit Valley Only
uolumne Meadows
Big Oak Flat Entrance Station
MERCED RIVER
emite ey
Arch Rock Entrance Station
Point
70%
Visit Yosemite Valley
60%
of Valley Visits Also Visited Glacier Point or Mariposa Grove
30%
Visit Non-Valley Activity Areas Only
N
South Entrance Station
Mariposa Grove
3,258 Vehicle Sample Size
100%

Table ES-1: Daily Visitor Use Levels for Developed Areas in Yosemite

Developed Area	Day Use Visitors	Overnight Visitors
Yosemite Valley District		
Yosemite Valley	10,530	7,711
Cascades/Arch Rock	360	0
El Portal	765	0
Wawona District		
Chinquapin	810	0
Badger Pass	3,300	0
Bridalveil C.G./Summit Meadow	360	490
Glacier Point	7,650	0
Wawona	1,689	1,622
South Entrance Station	4,525	0
Mariposa Grove	3,850	0
Mather District		
Tioga Pass	540	0
Tuolumne Meadows	1,485	2,048
White Wolf	45	675
Tenaya Lake Area	720	0
Crane Flat	900	800
Tioga Road Campgrounds	0	1,250
Hodgdon Meadow	540	800
Foresta	90	30
Hetch Hetchy	1,080	0
Mather Station	0	120
Merced Grove	405	0
High Sierra Camps	0	168

Source: Yosemite National Park, General Management Plan

TRANSPORTATION IN YOSEMITE

On an average summer day in 1992, 6,500 to 7,000 vehicles entered Yosemite National Park. The south entrance station accommodated the greatest number of entries, with 27% of the 1992 peak season traffic. Arch Rock entrance, on the west, accounted for 24%, as did the north entrance at Big Oak Flat. The Tioga Pass entrance, serving travelers from the east, was only slightly behind the others at 22% of 1992 peak season entries. The Hetch Hetchy entrance, which does not provide access to the rest of the park, accounted for the remaining 2% of the 1992 summer vehicle entries into Yosemite. The park entrance volumes are shown on the attached map.

The south entrance near Mariposa Grove accommodates the highest number of park entries.

Tour buses are the fastest growing mode of travel to Yosemite. Tour bus access to Yosemite was first allowed in 1977, and by 1983 there were 3,021 tour bus trips. In 1992, there were 13,313 bus tours — an increase of 1,144 trips per year or an average annual growth rate of 17.9%. Based on an estimated average occupancy of 40 persons per trip, bus visitors have increased from 5% of all recreation visits in 1983 to 14% of all visits in 1992. Tour bus travel can be expected to continue increasing, driven by aging of the population, increased visitation by foreign travelers, and increased emphasis on alternative transportation modes.

The highest traffic volumes in the park are found in Yosemite Valley. In July 1992 the average one-way daily traffic volume on the Northside Drive leading out of the valley was 6,300 vehicles. On holiday weekends during the peak summer season, hourly volumes entering the park approached 1,100 vehicles. July two-way average daily traffic volumes on the other major park roads ranged from a high of 5,150 on Big Oak Flat Road southeast of Crane Flat to 2,950 on the Arch Rock entrance road.

For the typical visitor to Yosemite, driving through the park provides the primary means of experiencing its views and vistas. Even on the busiest summer days, travelers on the park roads encounter minor to moderate congestion, except at key activity areas and at the park entrance stations. As a result, driving into the park is usually a pleasurable experience, contributing to visitors' enjoyment of Yosemite. The ability to make informal stops along the park roads to take advantage of the unique and varied scenery contributes to each visitor's opportunity to experience the park on his or her own terms.

Transportation problems occur on a daily basis at the three major activity areas of Mariposa Grove, Tuolumne Meadows, and Yosemite Valley. Glacier Point, another significant visitor destination, experiences fewer problems because of the short duration of the typical visitor's stay. The capacity of the parking lot and the viewpoint appear to be in relative balance, so that the viewpoints and surrounding walking paths begin to feel crowded before the parking area is full. Based on an estimate of the duration of the typical visitor's stay, the parking area at Glacier Point and the road leading to the point can accommodate a greater number of visitors than the maximum specified in the general management plan.

The most significant aspects of the transportation problems and related resource impacts in each activity area are discussed below.

Mariposa Grove and Wawona

Mariposa Grove is served by a small parking area located within the lower grove. Parking demand exceeds the supply on nearly every summer day, causing the grove access road to be closed to visitor traffic in the late mornings and early afternoons. Visitors are directed to overflow parking areas located adjacent to the south entrance and seven miles to the north in Wawona. A shuttle bus service is provided between the parking areas and the grove. The use of the overflow parking area in Wawona and ridership on the shuttle bus system have increased tremendously. Parking in Wawona conflicts with visitor access to the store. Demand has grown to the point that strip parking along the roadway is used, along with the formal parking areas near the store.

Traffic conflicts at the south entrance road have multiplied with the increase in visitation to the grove. The entrance station, parking for a restroom facility, a small overflow parking lot, and the control point for the grove access road, are all within a short distance of the heavily traveled three-way intersection, creating a nearly impossible traffic management situation. Conditions are worst when the grove access road is closed, requiring vehicles to turn back into the intersection they just traveled through.

The Wawona shuttle serves excess demand to Mariposa Grove.

Traffic safety problems arise when the two entrance lanes, which feed directly into the intersection, are open. Northbound vehicles using the right lane cross the path of vehicles bound for the grove from the left lane. Visitor confusion is a very significant problem due to the traffic conflicts and the varying means of access to the grove, depending on the closure status of the parking lot and access road.

The Wawona shuttle system has been effective in serving the demand for access to the grove from overflow parking areas, but the service can be irregular, causing delays and uncertainty for passengers. A schedule that is achievable, considering travel times and the potential for delays, should be developed and followed. A regular schedule would help to distribute demand over time and could reduce the number of buses needed to carry the current demand.

The travel patterns of some visitors making a stop at the grove as part of a trip to or from other areas of the park are duplicated by the shuttle system, resulting in increased vehicular travel and pollutant emissions. For example, a visitor trip involving a stop at Mariposa Grove enroute from the south entrance to Yosemite Valley would involve the following trip segments:

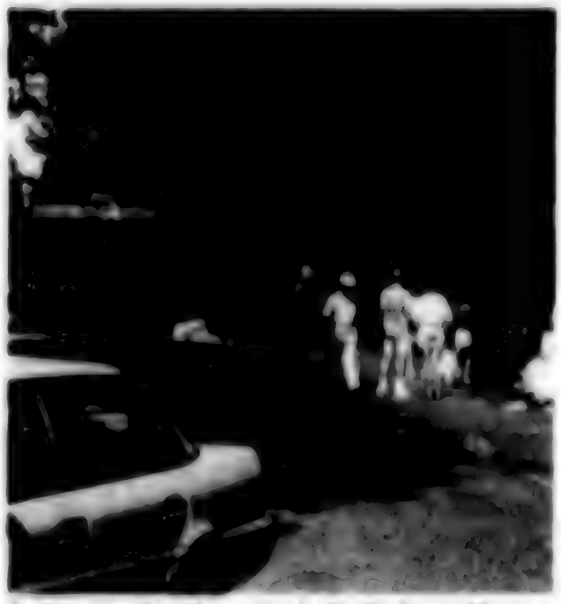
- private vehicle trip from south entrance to Wawona
- shuttle trip from Wawona to Mariposa Grove along the same route used by the private vehicle to reach Wawona
- shuttle trip from Mariposa Grove to Wawona along the same route
- continuation of the private vehicle trip to Yosemite Valley

The introduction of the shuttle connection between Wawona and the grove results in a net increase in vehicular travel for this specific travel pattern, since private vehicle travel is not reduced, but additional shuttle travel is required.

The parking area in the lower grove represents a threat to the continued vitality of the giant sequoia trees in the area and an intrusion of human influence in a rare and sensitive environment. The National Park Service intends to remove the parking from the grove and establish visitor access at a more appropriate location. The development of a new parking area away from the giant sequoia trees offers the opportunity to effectively manage visitor use, reduce the traffic conflicts associated with the grove access road, and remove the spillover parking impacts from the store lot and roadside in Wawona. Improvements to the south entrance station to resolve the current traffic conflicts and visitor confusion could be an additional improvement within the overall project to address grove access and parking.

Tuolumne Meadows

Tuolumne Meadows experiences traffic conflicts due to a shortage of parking within the meadows and at the various trailheads scattered along Tioga Road to the west. Additional vehicular circulation is occurring as visitors search for parking places, and parking is spilling out of formal areas and onto the shoulders of Tioga Road. Pedestrians cross at random locations and parking maneuvers disrupt the flow of through traffic.



A shortage of parking exists in the Tuolumne Meadows area.

The Tuolumne Shuttle, implemented in 1991, offers convenient service to overnight visitors if they can secure a parking space. Day use visitors to the area have as much trouble finding a parking spot near a shuttle stop as a spot at the activity areas they desire to visit. Very little information and promotion of the shuttle service is provided to day users, many of whom may not be aware of its availability. As a result, the shuttle has not been effective in reducing the impacts of informal roadside parking.

The Tuolumne River and Tuolumne Meadows provide one of the most significant subalpine nonforest wetland habitats in Yosemite. The meadows is an archeological district and the river through the meadows is designated under the Wild and Scenic River Act.

Significant habitat and wetland disturbance and soil compaction is occurring in the meadows because of dispersed visitor facilities, little interpretive information about the sensitivity of the area, and inadequate designated parking areas. Widespread informal, pulloff roadside parking and a proliferation of social pedestrian trails that crisscross fragile meadows and riparian areas to the river have resulted from the current parking shortage. Pulloff parking also destroys natural roadside vegetation and increases soil erosion from roadway runoff.

Tuolumne Meadows is more sensitive than meadows at lower elevations because the shorter growing season makes natural and assisted revegetation of disturbed areas more difficult. In addition, the impacts to the river edge environment caused by random social trail access are inconsistent with its wild and scenic designation.

The primary need in the Tuolumne Meadows area is for a centralized facility for parking and access to the shuttle system. The development of such a facility would also offer the opportunity to relocate some of the scattered visitor facilities which now fragment the meadow habitat and contribute to an inconsistent, strip development character.

Yosemite Valley

Traffic volumes on holiday weekends exceed the capacity of the Valley Loop roadway system. Congestion is a reoccurring problem at the village intersection and the Yosemite Falls intersection on the Northside Drive. A traffic management strategy that diverts vehicles bound for the Valley at El Capitan crossover is

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implemented on three to four days during the summer. Unfortunately, with the current arrangement it is not practical to sort day use traffic from the vehicles carrying visitors with overnight reservations in the valley. As a result overnight visitors must circulate through the west end of the valley waiting for access to be reopened, resulting in increased vehicular travel and emissions. A more restrictive traffic management strategy was used on some weekends in 1993. Visitors were directed away from Yosemite at the entrance stations during highly congested periods.

Yosemite Valley is a focal point for visitors and traffic.

The formal parking areas serving the most active visitor facilities are perpetually full. On summer weekends, parking spills out of the formal areas onto roadsides throughout the east end of the valley. Traffic and pedestrian conflicts are common during the periods of maximum visitation.

The valley shuttle system, which has operated in some form for over 20 years, provides frequent, free service for visitor and employee trips between destinations within the east end of the valley. An average of 22,600 passengers rode the shuttle system per day in August 1992. Annual ridership in 1991 totalled nearly 3.4 million. The service eliminates a substantial number of vehicular trips that would otherwise be made for circulation among the various visitor services and activity areas in the valley. However, the location of the primary day use parking area at the far eastern end of the valley results in traffic congestion that significantly affects the speed and reliability of the valley shuttle system. Crowding is a constant problem during peak demand periods, with buses occasionally passing up passengers waiting at stops.

Because it is the focal point of most park visits, the urbanization of Yosemite Valley is particularly intense. The valley contains four separate development centers: Yosemite Lodge, Yosemite Village, Ahwahnee Hotel, and Curry Village. Each year 2.5 million visitors and nearly 1 million cars, trucks, and buses crowd into the valley. Thirty miles of roadway bisect the valley floor, providing access to scenic, natural, and cultural attractions and to a scattered array of stores, restaurants, hotels, residences, and service buildings.

Directly associated with the structures are individual parking areas of varying sizes, which create dispersed and fragmented patterns of

The valley shuttle system carries over 22,000 riders per day.

development similar to strip commercial areas found throughout many towns and cities. This pattern of development significantly impairs the anticipated natural experience of park visitors and compromises sensitive natural environments unsuited for this type and intensity of use.

Other examples of spreading urbanism in the valley include an abundance of regulatory and informational signage, incompatible architectural styles, traffic congestion and roadside parking on major roads, crowding at major attractions, loss of natural environment, proliferation of social trails, and increasing conflicts among pedestrians, bicyclists, and vehicles. Impacts to the quality of surface waters in the valley occur from vehicular use within the park through the release of hydrocarbons via runoff or spills. In addition, increased vehicular traffic and informal road side parking disrupt wildlife access to surface waters and increase the potential for animal/vehicle conflicts. In the valley, the Merced River is effectively cut off on both sides by high volumes of vehicular traffic, parking areas, and buildings.

When the reductions in overnight accommodations called for in the concession services plan and general management plan are implemented, approximately 4,000 daily vehicle trips will be made into the valley by visitors going to lodging units, campsites, and day use activities. An equal number of outbound trips also will be made. Day use traffic will account for over 77% of these vehicle trips, as shown in table ES-2. Reduction or elimination of the day use trips has the potential to eliminate most of the negative impacts associated with private vehicles in the valley.

TRANSPORTATION ALTERNATIVES

Transportation system alternatives were developed to address the following functional requirements in Yosemite National Park:

- access to the Mariposa Grove
- circulation in Tuolumne Meadows and access to high-use activity areas along the Tioga Road west of Tuolumne Meadows
- access to Yosemite Valley
- circulation in Yosemite Valley

The needs of day use visitors, campers, backcountry users, and lodging guests were considered in the development and evaluation of the alternatives. The improvements considered included relocation and expansion of parking facilities, reduction of traffic conflicts through facility relocations and roadway improvements, remote staging areas serving activity centers, enhanced VTS bus services, and the implementation of at-grade and elevated fixed-guideway transit systems. Opportunities to

Table ES-2: Yosemite Valley Daily Vehicle Access and Egress Trips by Visitors

User Type	Daily Users	% by Bus	Number of Units	Party Size	Vehicle Occupancy	Number of Vehicles	Max. Veh. in Valley	Length of Stay (Nights)	Daily Vehicle Trips
Day	10,530	15	NA	2.9	2.9	3,086	1,750	0	6,172
Hotel	3,679	15	1,215	3.0	3.0	1,033	1,033	2.7	765
Camping	4,032	0	765	5.3	2.9	1,390	1,390	2.7	1,030
Backcountry	145	0	145	1.0	2.9	50	50	2.7	40
Total	18,386	NA	2,125	NA	NA	5,559	4,223	NA	8,007

Source: BRW, Inc.

capitalize on the resource enhancement potential of visitor transportation systems by relocating visitor facilities and realigning transportation corridors out of sensitive areas were also identified.

Criteria were prepared to guide the development of transportation system alternatives, to focus the initial screening of alternatives to a smaller set of feasible options, and to direct the comparison of the feasible alternatives for Yosemite. The criteria were developed to respond to the study purpose as stated in the Intermodal Surface Transportation Efficiency Act, and to account for the unique transportation problems and environmental conditions at Yosemite.

Essential Requirements

To be considered for detailed evaluation, transportation improvement alternatives for Yosemite were required to have the following essential characteristics:

- be able to accommodate GMP visitation levels in all areas
- allow visitation to be managed to achieve GMP visitation levels
- afford a meaningful reduction in private vehicle travel
- avoid duplicating private vehicle travel patterns due to multiple visitor destinations within the park and travel between entrance stations
- allow current visitor use patterns to continue, including the ability to conveniently visit more than one area of the park in a one-day visit, allow trips through the park to be made by entering and exiting through different gates, and allow visitors to experience a full range of scenic and wilderness-oriented activities
- be compatible with local transportation plans
- reduce vehicle-related emissions
- reduce energy consumption associated with transportation
- maintain visual quality in key areas, especially the pristine view across the west end of the valley from Discovery View and the view into the valley from Glacier Point
- employ proven, available technologies for visitor transportation systems
- be capable of operating in a safe manner in the Yosemite environment
- comply with the requirements of the Americans with Disabilities Act
- allow unrestricted movement of wildlife across and along the transportation system

Transportation alternatives should maintain visual quality in key areas.

Finally, the alternatives had to represent potentially cost-effective solutions to transportation problems and resource impact concerns in Yosemite, considering the magnitude of the problems and the level of investment required.

The alternatives that were developed for initial and detailed assessment are listed below and illustrated on the maps located at the end of the Executive Summary.

Mariposa Grove Access

Three alternatives for accessing the grove that would seek to enhance visitor awareness and enjoyment and to restore and protect the ecosystem of the giant sequoias were identified for initial screening:

Grizzly Giant Staging Area. This alternative would involve removing the existing parking from the lower grove and developing a new parking lot and staging area east of the existing lot and south of the grove near the Grizzly Giant.

The new parking lot would provide 200 automobile and recreational vehicle (RV) spaces and 10 tour bus spaces. Also relocated to this area would be the grove tram and its related facilities and the drop-off/pickup for a courtesy shuttle to the Wawona Hotel and campground. The courtesy shuttle would be provided for the convenience of overnight visitors in the Wawona area and to reduce the vehicular travel associated with trips by Wawona visitors to the grove. Other facilities not required for resource management would also be relocated away from the grove. Linkages to existing trails in the grove as well as those external to the grove would be made. Visitors would access the upper grove either by the tram or on foot. The lower grove would be reached from the Grizzly Giant on foot only, following the existing hardened pathways.

Visitors would drive to the new staging area on the existing Mariposa Grove access road; however, just prior to entering the lower grove, a new two-way grove by-pass road would be constructed. This by-pass would be located south of the lower grove and would be approximately .75 mile long.

Alternative access to the new staging area could be provided by upgrading a U.S. Forest Service (USFS) road east and north of Goat Meadow. This two-way road would be approximately 3 miles long. The road, which was considered as an alternative access route in a draft development concept plan (DCP) for the grove, follows steep terrain. It is not explored in detail here, but could be evaluated as part of a new plan for the area. If used, the Goat Meadow access route would require the relocation of the south entrance station to the south of the Goat Meadow access road intersection with California Highway 41, near the park boundary.

The information on the accompanying map for Mariposa Grove access options provides an overview of the proposed service and the equipment required for the Wawona courtesy bus. Charts included in appendix 8 contain additional details for this alternative.

Goat Meadow Staging Area. This alternative includes the removal of the existing automobile parking lot from the lower grove and development of a new parking lot and staging area southwest of the grove in Goat Meadow, which is on USFS land. Visitors would be shuttled to the grove from the new parking lot via California Highway 41 and the existing Mariposa Grove access road.

The new parking lot would provide 290 automobile and RV spaces. A courtesy shuttle serving the Wawona Hotel and campground, regional tour buses, and the Goat Meadow shuttle would use the existing staging area at the edge of the lower grove to board and drop-off passengers. Connections with the grove tram would occur as they do today. With the Goat Meadow alternative, it would be necessary to relocate the south entrance station approximately .75 mile south to a location south of the Goat Meadow access road. The existing grove access road would be closed to private vehicular traffic year-round.

The information on the accompanying map for Mariposa Grove access alternatives provides an overview of the Goat Meadow shuttle and the Wawona courtesy bus service. Additional details for this alternative are presented on charts included in appendix 8.

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Buses could provide courtesy shuttle service to Mariposa Grove from Wawona.

Wawona Staging Area. This alternative includes the removal of the existing automobile parking lot from the lower grove and development of a parking and grove shuttle bus staging area within the Wawona district. Several alternative staging area sites in the Wawona district were examined. Access to Mariposa Grove would be via a shuttle bus serving the staging area and the Wawona Hotel and campground, or by tour bus. All buses would pick up and drop off passengers at the existing staging area in the lower grove, where connections to the grove tram would be made. Within the Wawona district, parking would be provided for 350 cars and RVs. Although not essential to this alternative, the south entrance station could be relocated south to reduce traffic conflicts at the grove access road intersection with California Highway 41 and to accommodate expanded visitor information, orientation, and reservation services. Information and orientation would also be required at the Wawona staging area.

The map for Mariposa Grove access options, located at the end of the Executive Summary, provides a summary of the Wawona shuttle service and vehicle fleet included in this alternative. Additional details for this alternative are summarized on charts included in appendix 8.

Tuolumne Meadows/Tioga Road Circulation

Two alternatives to improve Tuolumne Meadows and Tioga Road circulation were developed for detailed analysis. Each included the development of a new staging area east of the meadows at a gravel pit located north of Tioga Road. The staging area would act as the primary access point for two shuttle services. One shuttle would serve circulation within the Tuolumne Meadows area, with a route similar to the current shuttle. The second shuttle would provide access to the trailheads located along the Tioga Road west of the meadows to Olmstead Point. To facilitate boarding and alighting, low floor buses would be used along both routes, with modifications to accommodate backpacking gear, climbing equipment, and other recreational items.

The alternatives differed in the treatment of visitor parking along the route. The first alternative was a mandatory shuttle system. The existing parking areas in the meadows and along Tioga Road would be removed. Enforcement would be required to curtail parking along the roadsides at activity areas. Parking would remain in the campground, lodge, Dog Lake trailhead lot, and wilderness permit lot for overnight visitors. All other day use visitors, including those arriving by tour bus, would be required to park in the staging area.

The second alternative was a voluntary shuttle system, which assumed that the existing formal parking areas along the road would remain. Prohibition of roadside parking and parking in unmarked, informal areas was also assumed as part of the voluntary shuttle option, with the staging area and shuttle service taking the place of overflow parking. Careful delineation of the parking areas and active enforcement would be required to eliminate resource damage due to roadside and spill-over parking. Tour bus parking would be located in the new staging area. The operations of both alternatives could be enhanced with a west end staging area near Tenaya Lake. However, no acceptable location for such a staging area has been identified to date.

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Low-floor buses would be well-suited for shuttle service along Tioga Road.

The gravel pit site could accommodate visitor services and administrative functions now located within sensitive areas of Tuolumne Meadows. Depending on the configuration of the site and the ancillary facilities to be located there, a portion of the new development could fall within lands designated as wilderness. Although impacted by the gravel pit, development within this portion of the wilderness area would require congressional action to change the wilderness boundary. Considering the potential opportunity to eliminate impacts of visitor and administrative facilities to areas near or within the wild and scenic river designation and in sensitive natural habitats, a wilderness boundary change in the gravel pit area may be acceptable.

The maps for the Tuolumne Meadows/Tioga Road access alternatives, located at the end of the Executive Summary, provide descriptions of the service and equipment for both options. Additional details for each alternative are presented on charts included in appendix 8.

Yosemite Valley Access and Circulation

A broad range of options to reduce the presence and impact of private vehicles in Yosemite Valley were evaluated. The analysis considered the following:

- Should both overnight and day use visitor trips be diverted to a visitor transportation system (VTS)?
- Should staging areas be located near or within the valley, at remote sites in the park, or at sites outside the park boundary?
- What routes can best serve visitor transportation needs within the valley?
- What technologies are most appropriate for use in the unique environment of the valley?

VTS alternatives to serve overnight visitors to the valley were considered, but not carried forward for detailed evaluation. The following factors led to the decision to plan for overnight visitors to continue to travel to their overnight accommodations in private vehicles:

- Analysis of travel patterns revealed that 77% of the vehicle trips to and from the valley are associated with day use visits (see table ES-2).
- High costs of equipment and vehicles to carry baggage and camping gear
- Expected visitor resistance to being separated from luggage and equipment
- Potential for loss and/or damage to camping equipment and baggage
- Need for and cost of overnight security in remote staging areas

Two concepts for intercepting day use private vehicle traffic and transferring passengers to a visitor transportation system were developed and evaluated.

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- A system of staging areas in remote locations that would intercept traffic on each route to the valley. Visitors would be carried on buses to the valley, where they would transfer to a circulator system to reach individual destinations within the valley.

- A single staging area located in an appropriate site within the valley that would be served by a shuttle connector for access to the Yosemite Village area, where visitors could transfer to a circulator system similar to that proposed in the previous concept.

Two alternative remote staging area plans were developed to represent the range of potential options within this concept. One plan located staging areas outside the park near the south entrance, in El Portal near the west entrance station, and near the north (Big Oak Flat) entrance station. It was assumed that travelers to the valley from the east entrance (Tioga Pass) would be directed to the north staging area.

The second plan located staging areas within the park at Badger Pass and Crane Flat and outside the west entrance in El Portal. The Crane Flat staging area was assumed to serve Tioga Pass traffic bound for the valley. The two remote staging area concepts are illustrated on the accompanying map.

Table ES-3 compares the remote staging area alternatives with an in-valley staging area. The in-valley staging area was assumed to be located at Taft Toe for this comparison.

The remote staging concept would require between 7 and 10 additional acres for parking development, 40 to 62 additional buses, $10.8 to $16.5 million in additional construction and equipment costs, and $12.0 to $18.5 million in additional operating costs per year. The total cost increase for remote staging compared to in-valley staging ranges from $13.2 million to $20.2 million on an annualized basis.

Table ES-3: Comparison of Remote and In-Valley Staging Areas for Yosemite Valley Access

Comparative Measure	Staging Areas Outside Park	Remote In-Park Staging Areas	Taft Toe Staging Area
Number of Parking Spaces	2,720	2,470	1,840
Number of Buses Required	83	61	21
Construction and Equipment Cost	$27,337,000	$21,692,000	$10,864,000
Annual Operating and Maintenance Cost	$21,639,000	$15,190,000	$3,158,000
Average Delay to Through Travelers	2 hrs. 12 min.	1 hr. 37 min.	23 min.

Source: BRW, Inc.

Note: Accommodates day use only. Costs represent total costs (contingency, planning and supervision percentages applied where appropriate) for vehicle fleet and parking spaces only. Does not include valley circulator VTS.

Remote staging areas would offer a potential benefit by reducing private vehicular travel throughout the park. However, significant decreases in private vehicle use would be achieved only for visitors who enter and exit Yosemite via the same gate and do not visit other activity areas in the park. Only 21% of the current visitors to the valley make this type of visit. Most valley visitors would make private vehicle trips along the same routes traveled by the shuttle systems after visiting the valley, offsetting the private vehicle travel savings associated with remote staging areas.

Other considerations favoring an in-valley staging area strategy include:

- Remote staging areas would limit visitors' ability to stop at features along the park roadways for sightseeing and other activities.
- Potentially higher levels of particulate and nitrogen oxide (NOx) emissions would be generated by high volumes of bus travel on park roads.[1]
- Increased noise levels on park roads and in the valley would be associated with high volumes of bus travel.
- Complex visitor communications and management system requirements would exist at multiple sites to sort non-valley, valley day use and valley overnight traffic. Similar functions would need to be accommodated at the entrance to the valley as well as the remote staging areas.

As a result of these factors, the analysis of VTS options for Yosemite Valley assumed an in-valley staging area site.

Several staging area site alternatives within Yosemite Valley, shown on the Yosemite Valley Staging Options map, were identified and analyzed:

- Pohono Quarry
- Valley View
- Bridalveil Falls area
- Yellow Pine
- Camp 6 (Sentinel Bridge)
- Curry Orchard (current primary day use parking)
- Old Curry dump site
- Taft Toe (El Capitan crossover)

The Camp 6, Curry Orchard and Curry dump sites offer little opportunity to reduce private vehicular traffic because of their location toward the east end of the valley.

The Taft Toe site offers several advantages over the other candidates in the western end of the valley, including:

- No impact to sensitive views into or within the valley
- No impact to Merced River flood plain or wild and scenic river designated area
- Adequate land area to accommodate surface or structured parking and additional visitor services and administrative facilities
- Most convenient access from and egress to the parkwide road network
- Convenient visitor access management for overnight and day users

Private vehicular travel, bus travel (assuming that a shuttle connection between the staging area and Yosemite Village and Yosemite Lodge would be provided by buses) and VTS capital and operating costs for the Taft Toe site were compared to those for the Yellow Pine and Pohono Quarry sites. Table ES-4 shows the key findings of this comparison.

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The Pohono Quarry site would minimize private vehicle travel, since it would intercept all day use valley visitors entering from the north and west at the west end of the valley. The Yellow Pine site would generate the highest volume of private vehicle travel, since all visitor trips would traverse the valley loop as far east as Sentinel Bridge on their exit route from the valley. The Taft Toe site would generate private vehicle travel volumes which would be substantially lower than those for Yellow Pine, although higher than those for Pohono Quarry.

The private vehicle travel reductions possible with the Pohono Quarry site would be achievable only with an expanded VTS fleet and higher VTS operating costs. A bus-based VTS connection from the staging area at Pohono Quarry would require over 5,200 daily bus miles, compared to 3,200 for Taft Toe and 2,000 for Yellow Pine.

Higher particulate and NOx emission rates of diesel buses would offset emission reductions from private vehicles, potentially resulting in poorer air quality for a quarry staging area site than for a Taft Toe site. Future alternative fuels advances for buses could reduce the undesirable emissions associated with a bus shuttle system for any of the staging area sites and could reduce the emissions disadvantage of the Pohono Quarry site relative to Taft Toe.

A guideway technology employing electrically powered vehicles would eliminate the noise and emissions impacts of a Pohono Quarry staging area. Such a system would be 2.5 miles longer for the Pohono Quarry site than for Taft Toe. The capital cost increase for a guideway connection from the quarry, compared to Taft Toe would be $78.2 million. Annual operating costs would also be substantially higher for a fixed guideway system serving the quarry.

Although the Pohono Quarry offers the potential for significant reductions in private vehicle travel, the vehicular travel reduction benefits of this site would be balanced by negative impacts to the valley vista from Discovery View and higher development costs for parking due to the need for a parking structure. Increased management staff and facilities would be required to confirm overnight reservations and limit day use vehicle access at El Capitan

Table ES-4: Comparison of Valley Staging Areas

Comparative Measure	Pohono Quarry	Yellow Pine	Taft Toe
Private Vehicle Vehicle Miles Travelled Per Year in Valley	905,538	7,582,854	3,325,560
Bus Vehicle Miles Travelled Per Year in Valley	1,408,900	531,800	877,100
Total Vehicle Miles Per Year	2,329,800	8,113,300	4,202,000
Bus Fleet Capital Cost	$6,525,000	$3,480,000	$4,567,500
Bus Fleet Operating Cost Per Year	$5,072,100	$1,914,400	$3,157,700

Source: BRW, Inc.

Note: Assumes shuttle connection between staging area and Yosemite Lodge via Camp 6 using bus technology. Accommodates day use visitors only. Bus fleet cost represents total cost (contingency percentage applied).

crossover. There would be greater impacts to the Merced scenic river corridor, and higher capital and operating costs for the visitor transportation system.

Considering its advantages and the drawbacks of the other potential sites, for the purposes of this study, Taft Toe was assumed to be the site for a staging area for day use visitors to Yosemite Valley.

The final valley visitor access alternatives consisted of a staging area and a transportation system comprised of two shuttle routes. Day use visitors arriving by private vehicle would be intercepted at a staging area located at the El Capitan crossover in the Taft Toe area. Tour buses bringing day use visitors into the valley would proceed to Camp 6, where a bus parking area would be provided. As an option, day use tour bus passengers could be dropped off and their buses parked at the Taft Toe staging area.

Overnight lodging guests and campers would drive their vehicles to their accommodations, where they would remain parked for the duration of the visitors' stay in the valley. Tour buses with overnight guests would drop passengers off and pick them up at the lodging facilities and then park, either close to the lodging area, at Camp 6, or at the staging area. The staging area could include an overnight visitor check in facility, where reservations could be confirmed. Visitors awaiting accommodations on a stand-by basis could be served at this facility. The valley visitor transportation system could be clearly explained to all visitors.

The first shuttle route (valley connector) would provide service between the staging area and the Yosemite Lodge/Yosemite Falls area via the Southside Drive and the Sentinel Bridge crossover. Stops would be made at the major activity points along the way in each direction. The second shuttle route (valley circulator) would serve the east end of the valley, traveling between the Ahwahnee Hotel and Happy Isles Nature Center, using the Sentinel Bridge crossover and Southside Drive. A transfer point between the two routes would be provided in the vicinity of Camp 6, and each route would serve the village. Day use tour bus passengers would have access to both routes at the Camp 6 transfer station.

Four technology options were developed for each shuttle route; standard bus, articulated bus (passenger trams could also be considered), light rail transit (LRT), and an elevated people mover using group rapid transit (GRT) technology. light rail transit would be constructed at grade, most probably adjacent to the existing roadway, although it would be possible to construct the system in the roadway, where it would share the lanes with private vehicular traffic. LRT vehicles would be powered by electricity delivered to the vehicle by an overhead wire.

GRT options would involve the construction of an elevated guideway, 16 to 17 feet above the valley floor. GRT vehicles would be electrically powered by a special contact rail located in the guideway, or by linear induction motors which would operate with electrical current within the guideway. The GRT system would require elevated stations, with elevators for disabled access and stairs or escalators for general visitor access.

The system of day use visitor access and circulator service for all visitors would require supporting actions to be most successful. Along with the new staging areas and the VTS routes, the following improvements and modifications to current operations would be required:

- Remove visitor parking from all activity areas except for reserved parking spaces at lodging sites and campgrounds. Limited parking would be provided for disabled access. Short-term parking for campers shopping at the Curry Village store could be considered in the Curry Orchard. Overnight visitors would be informed of parking limitations and the use of the valley shuttle system after they had reached their overnight destination.

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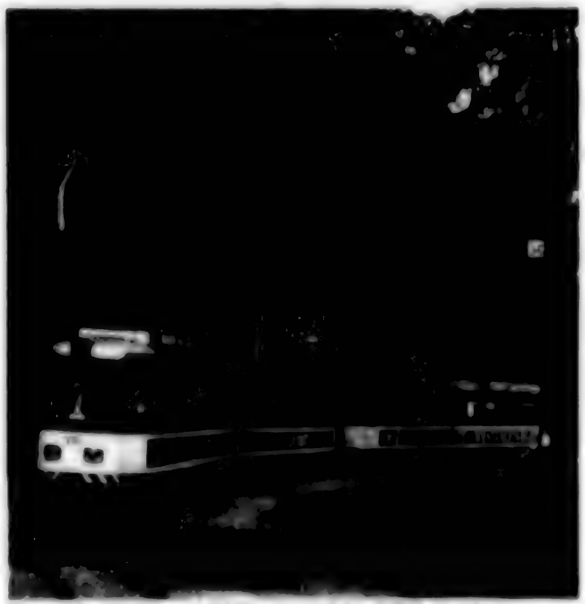
- Provide more services at Curry Village to direct visitor-related demand away from the store in Yosemite Village.

- Relocate some or all visitor center functions to the Taft Toe staging area. At a minimum, provide visitor information, orientation and interpretation, and restroom facilities at the staging area. Confirmation of overnight reservations would be required for lodging, camping, and backcountry users. Day users will also need to check in if reservations are implemented for valley day use. Fast food services, concession-operated gift sales and service station functions could be located at the staging area. Bike rentals could be provided to reduce shuttle demand. For the LRT and GRT options, vehicle storage and maintenance would be located at Taft Toe. The bus alternatives could use Taft Toe or another location for vehicle storage and maintenance.

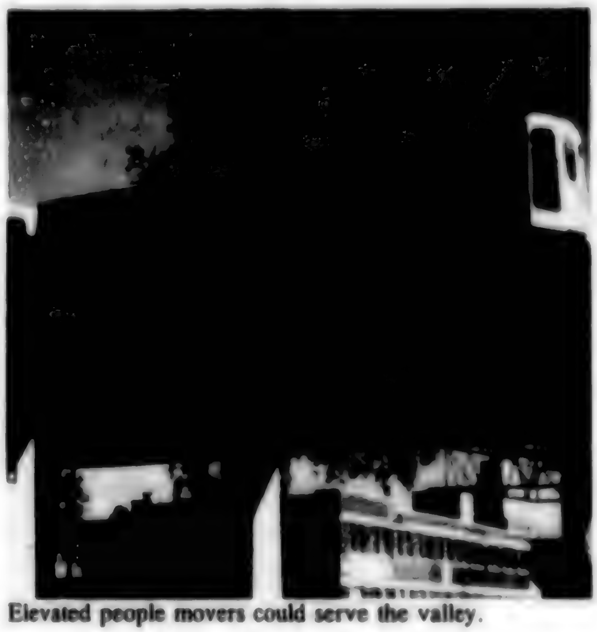


Yosemite Valley could be served by LRT shuttles.

- Relocate camping and the stables from the north side of the Merced River to reduce habitat fragmentation and streambank damage and provide wildlife access to the stream from the north. The river campgrounds and the group camp would be affected by the relocation, which would allow closure and removal of Stoneman Bridge. Shuttle alternatives that would allow the existing facilities to remain are shown as staging options in a series of maps included at the end of the Executive Summary.

- Close the Northside Drive between Sunnyside Campground and El Capitan crossover to visitor traffic. Closure of the Northside Drive would also be possible from El Capitan crossover to Pohono Bridge if the Southside Drive was upgraded to four lanes. This would remove visitor traffic from all of the north side of the valley except for the short stretch between Yosemite Lodge and the Ahwahnee Hotel. The roads on the north side could be retained for NPS needs and bicycle traffic only.

The Yosemite Valley VTS Alternative map, located at the end of the Executive Summary, summarizes the key aspects of each of the VTS options. Appendix 8 includes charts which provide additional details for each alternative.



Elevated people movers could serve the valley.

EVALUATION SUMMARY

The charts included at the end of the Executive Summary provide a convenient comparison of the alternatives against six evaluation categories. The following paragraphs highlight the most significant results of the evaluation process.

Mariposa Grove

The three alternatives would substantially reduce impacts to the resources from vehicles and the influence of automobiles on the visitors' experience in the lower grove. The Grizzly Giant option would have the greatest benefit, because it would remove all bus activity from the area, as well as all visitor parking from the grove. Each of the alternatives would contribute to reducing visitor confusion and frustration by providing a centralized parking area and a consistent means of accessing the grove. Much larger parking lots would be required for the Goat Meadow and Wawona alternatives, due to lengthened visitor stays. Visitor convenience would be less for these two alternatives, as well.

The Goat Meadow alternative would result in more vehicle travel within the park due to bus traffic and a substantial number of auto trips which would double back along the route to the staging area. The Wawona site would reduce vehicle miles traveled, but it could still cause an increase in particulate and nitrogen oxide emissions from buses. The Grizzly Giant alternative would be the least costly, followed by Goat Meadow and Wawona. The costs for each alternative are presented in table ES-5.

Each of the alternatives would involve the construction of new facilities, resulting in the potential for disturbance to habitat and wildlife. There could be temporary impacts to local water and air quality and to the visitor experience. The Goat Meadow option would minimize the potential impacts within the park and is partially located on previously cleared ground.

Tuolumne Meadows

The primary advantages of developing a centralized parking area, as proposed in both alternatives, include improved access for day use visitors, particularly to the shuttle system; a reduction in vehicle circulation associated with visitors searching for parking spots; substantially reduced impacts to vegetation and soils from social trails and road-edge damage from parked cars; enhanced character of the area by a reduction in development intensity; and reduced pedestrian and vehicular conflicts. The development of a new staging area at the gravel pit site also would afford the opportunity to relocate the dispersed facilities now serving visitors in the Tuolumne Meadows area to a location which would offer improved visitor access, adequate space to include orientation and

Table ES-5: Cost Summary for Mariposa Grove Access Alternatives

Cost Element	Goat Meadow Staging Area	Wawona Staging Area	Grizzly Giant Staging Area
Construction and Equipment (millions)	$8.8	$8.7	$5.3
Annual Operating and Maintenance (millions)	$1.1	$1.7	$0.4
Annual GMP Visitors	854,700	854,700	854,700
Annualized Cost Per Visitor	$2.15	$2.89	$0.94

Source: BRW, Inc.

Note: - Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages are applied.
- Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

interpretive facilities, and a reduction in the haphazard strip development character of the prime resource area of the meadows.

The mandatory shuttle system would have the greatest potential to protect the habitat of the area by focussing all parking in one easily managed location. The disadvantage of this alternative is that it would require all visitors from the west to drive past the activity areas to reach the staging area. As a result, it would be less convenient for many visitors and could cause an overall increase in vehicular travel. The voluntary shuttle system would require more extensive parking enforcement to prevent spill-over parking near the remaining formal parking lots along Tioga Road. The mandatory shuttle alternative is substantially more costly, involving the construction of a larger new parking area and the operation of a larger bus fleet. Table ES-6 provides a summary of the costs of the two Tuolumne Meadows shuttle options.

Yosemite Valley Access and Circulation

The proposed valley alternatives all offer significant potential benefits to visitors, resources, and park management. Visitor access would be improved by providing a centralized parking facility with clear information and efficient access. The proposed alternatives would eliminate the need for all day users to negotiate the confusing valley road network in search of scarce parking spaces. Visitor experience would be enhanced by removing the disrupting influence of traffic congestion, roadside parking, and scattered formal parking facilities. Transit service levels would be very good, with short wait times and reduced crowding on vehicles compared to the existing shuttle system. The reliability of service would be improved by reducing delays from traffic congestion.

The valley's resources would benefit from the ability to remove visitor and VTS traffic from long sections of the Northside Drive, affording improved wildlife access to the Merced River and reduced streambank damage from over use by visitors. Vehicular traffic would be reduced by over 77% (see table ES-2, page ES-11), decreasing emissions and lessening the potential for contamination of the Merced River from particulate matter and accidental fuel spills.

Park management would be facilitated by focussing day use parking in a central location and by eliminating the present need for traffic control staffing during peak traffic conditions. Management of visitation to GMP levels would be simplified by limiting the supply of day use parking to the number of spaces needed to support the prescribed visitation. If a day use reservation system were implemented, the proposed staging area site would facilitate the confirmation of reservations for both day and overnight visitors.

All of the alternatives would require a substantial area for parking at Taft Toe. While over 1,800 new parking spaces would be developed at Taft Toe to accommodate day users, an equivalent number of parking spaces could be removed from more sensitive areas in the east end of the valley. The site would not be visible from the key viewpoints at Discovery View and Glacier Point and could be screened from the Merced River by locating the facility away from the Southside Drive. The development could be located out of the Merced river flood plain and would not disrupt critical meadow and meadow edge habitat. Site- specific archeological surveys would be required prior to any ground disturbance activities for construction of a staging area.

The service characteristics and visitor management opportunities for the valley alternatives are similar, with the exception of the need for stairway and elevator access to elevated stations for the GRT alternative. The elevated stations would make access to the systems less convenient, particularly for visitors with recreational equipment. The bus options would influence visitor experience by increasing bus noise levels and by resulting in more frequent vehicle arrivals and an almost constant shuttle bus presence. Specially configured buses could be used to reduce noise. Future developments in battery and hydrogen fuel cell technology could eliminate bus engine noise. The overhead wires

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Table ES-6: Cost Summary for Tuolumne Meadows Shuttle Alternatives

Cost Element	Mandatory Shuttle System	Voluntary Shuttle System
Construction and Equipment (millions)	$16.7	$13.4
Annual Operating and Maintenance (millions)	$1.4	$1.0
Annual GMP Visitors	317,644	317,644
Annualized Cost Per Visitor	$5.75	$4.46

Source: BRW, Inc.

Note: - Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages are applied.
- Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

which provide power for the LRT alternative would disrupt some foreground views and the views of some features from points along the guideway. The elevated guideway of the GRT alternative would have a major impact on foreground and longer-distance views and would most likely be visible from Glacier Point.

The resource impacts of the options are similar, although the LRT and GRT options would involve major construction activity within the archeological district and the potential for intermittent impacts to air and water quality associated with construction. These alternatives would require a large maintenance facility located within the valley (probably at the staging area), while the bus maintenance facility could be located out of the valley (if substantial increases in operating costs were acceptable).

The bus alternatives would be the least costly to implement and operate, but would require a larger operating staff. The highest cost option would be group rapid transit, followed by light rail transit. Both of the guideway transit options are significantly more costly than the bus alternatives. The LRT and GRT options would be the most complex to implement, requiring more extensive environmental documentation and specialized expertise for design and construction. Electrification upgrades would be required in the valley to deliver the necessary amount of power to both the LRT and GRT options. The bus alternative could serve as an initial step in a multi-phase development plan involving later development of a fixed-guideway system. Because of the very high ridership potential for the proposed systems, the cost per visitor is quite low compared to systems in other settings, ranging from about $1.40 per visitor for the bus options to over $10.50 per visitor for the GRT option. Table ES-7 summarizes the cost for two bus alternatives and the LRT and GRT options. A mix of bus and guideway systems could also be implemented with a corresponding reduction in costs.

RELATED VISITOR MANAGEMENT MEASURES

The majority of the transportation impacts in the major activity areas in Yosemite are associated with day use visitation. Summer season visitation is estimated to be at or near the prescribed levels on a daily basis at Mariposa Grove and on peak summer weekends in the valley and Tuolumne Meadows. The enforcement of GMP visitation goals is difficult in the valley and at Tuolumne Meadows due to the dispersal of parking areas and the lack of an effective control point where entries and exits can be monitored. Mariposa Grove offers a more manageable situation, with a parking lot of

Table ES-7: Cost Summary for Yosemite Valley VTS Alternatives

Cost Element	Standard Bus	Articulated Bus/ Passenger Tram	Light Rail Transit	Group Rapid Transit
Construction and Equipment (millions)	$26.4	$26.2	$279.1	$458.5
Annual Operating and Maintenance (millions)	$4.7	$3.3	$5.9	$5.3
Annual GMP Visitors	4,049,502	4,049,502	4,049,502	4,049,502
Annualized Cost Per Visitor	$1.76	$1.38	$7.05	$10.51

Source: BRW, Inc.

Note:
- Equipment total costs represent a net cost estimate plus 16% for contingencies. No supervision or planning cost percentages are applied.
- Facility total costs represent a net cost estimate plus 16% (of net) for contingencies, 15% (of net) for supervision and 25% (of net) for planning.

limited size and the opportunity to provide supplemental shuttle service with a capacity matched to the GMP visitation goal.

A day use reservation system would aid in the management of visitor use; however, without a means of checking entering traffic to confirm reservations and a place for safe and efficient diversion of visitors to areas of lower use or out of the park, implementation of a reservation system would not be practical. Controlled access points served by parking areas sized to correspond to the applicable visitor volume would make a reservation system workable. The system could reduce the number of visitors turned away from activity areas and would cut down on unnecessary travel into and through the park, especially if information could be provided to visitors as they travel on the major access routes toward Yosemite.

Intelligent vehicle/highway system (IVHS) technologies could be applied to the development of visitor management concepts, including reservation systems. Advance traveler information systems using signs, radio or in-vehicle terminals could be used to advise potential visitors of the up-to-the-minute status of lodging, camping, and day use reservation availability in Yosemite. These systems would be most effective for Yosemite visitors if located at the intersections of roads leading to the park with California Highway 99 and U.S. 395. Such traveler information systems, in combination with reservation centers located at the major access points to the roads serving Yosemite, would allow visitors to plan a Sierra vacation itinerary based on the availability of access to the park. A cooperative association of Yosemite National Park and the surrounding counties of Merced, Mariposa, Tuolumne, Mono and as well as the California Department of Transportation and the U.S. Forest Service, has been formed to improve visitor information regarding overnight accommodations, park access and other recreational opportunities, using Intelligent Vehicle Highway Systems.

Providing current information to visitors along California Highway 99 and U.S. 395 would afford visitors opportunities to change their travel routes, park entry points, or overnight plans. Providing information on park accessibility and the ability for visitors to make next-day reservations could eliminate unnecessary travel and support the economic development objectives of the communities.

The gateway communities now serve as overflow overnight lodging resources for visitors who would otherwise stay in the park. As visitation to Yosemite increases, more visitors would be expected to stay overnight in the gateway communities. Some trips to and from the park by visitors staying in the gateway communities could be served effectively by shuttle systems. Shuttle services could be provided by an association of lodging operators as an incentive to visitors. The successful implementation of shuttle systems serving overnight guests outside the park could reduce the number of parking spaces required for day users at the valley staging area to some degree.

IMPLEMENTATION AND FUNDING OPTIONS

The staging area and VTS improvements analyzed in this study would take several years to be planned, designed, and constructed. In the interim, the number of days with unacceptably high levels of congestion is likely to increase. Some short term improvements to better serve visitors are possible in Yosemite Valley and at Mariposa Grove. Without a better system of formalized parking it will be difficult to improve the effectiveness of the shuttle service in Tuolumne Meadows.

Mariposa Grove Staged Improvements

The existing visitor confusion and traffic conflicts associated with grove access could be reduced through improved signage and the development of a more reliable shuttle schedule. Signage improvements would include signs at the south entrance to give visitors advance warning that the road to the grove is closed. Similar signs are needed for northbound traffic in Wawona. Although not essential, the south entrance station could be relocated south to reduce traffic conflicts at the grove access road intersection with California Highway 41 and to accommodate expanded visitor information, orientation, and reservation services. Signs should also be provided at Wawona to clarify the location of the shuttle boarding area and the schedule of service for the shuttle. A specific vehicle assignment should be made to the Wawona shuttle system. A schedule should be developed to provide for vehicle arrivals at regular intervals. The schedule should be communicated to visitors. Service to the campground should be provided on a scheduled basis or eliminated so that campground visitors do not wait for Mariposa Grove shuttles that might not arrive.

Yosemite Valley Staged Improvements

Visitor access could be improved within the valley by developing Camp 6 as a formal day use visitor parking area. By providing a paved and striped lot, the capacity of the facility could be improved substantially. Access could be provided from the Sentinel Bridge crossover, reducing traffic at the heavily congested village intersection. The directional sign at the Sentinel Bridge intersection on the Southside Drive should be changed to direct Yosemite Lodge traffic and vehicles bound for the day use parking at Camp 6 over Sentinel Bridge. The Camp 6 parking area could reduce demand on the overloaded shuttle system by providing pedestrian access to the village for day users.

The long term VTS recommendations for the valley focus on the elimination of day use vehicle trips and simplification of the existing valley shuttle bus system for more efficient service. Along with the service improvements, visitor use of some existing valley roads and bridges could be eliminated and visitor facilities could be relocated to allow meadow and habitat resource restoration.

Implementation of the long-range transportation system in Yosemite could be accomplished in three stages as outlined below and illustrated on the maps located at the end of the Executive Summary.

Stage I

- Develop Taft Toe staging area, including relocation of visitor information center from Yosemite Village.
- Implement valley connector shuttle along Southside Drive (or modified to be raised out of meadows along south hillside) to connect the Taft Toe staging area with Yosemite Lodge.
- Implement valley circulator shuttle between the Ahwahwee Hotel and Happy Isles via

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Yosemite Village, Housekeeping Camp and Curry Village.

- Develop shuttle transfer point and tour bus parking at Camp 6.
- Relocate main valley visitor store to Curry Village. Maintain village store for employees and some visitors at Yosemite Village.
- Eliminate visitor traffic on the Northside drive between El Capitan crossover and Yosemite Lodge. Maintain emergency and service vehicle accessibility. Use road for pedestrian and bicycle circulation.

Stage II

- Relocate upper and lower river campgrounds if suitable sites can be identified; restore campground areas to natural conditions.
- Eliminate all traffic on Stoneman bridge road between Curry Village and the Yosemite Village intersection.

Stage III

- Widen the Southside Drive to four lanes from Pohono Bridge to the El Capitan crossover.
- Eliminate visitor traffic from Northside Drive between El Capitan crossover to Pohono Bridge.
- Provide designated El Capitan viewing and climber access parking area on north side of El Capitan crossover.
- Relocate stables to south of Merced River if a suitable location can be found; restore stables area to natural condition.
- Relocate group camp and North Pines campgrounds to area near relocated river campgrounds if a suitable site can be identified. Restore area to natural conditions.
- Terminate shuttle traffic at Happy Isles or at existing Mirror Lake shuttle stop.

The implementation of any of the VTS alternatives evaluated in this study would require new sources of funding. Potential sources include funding provided in the Intermodal Surface Transportation Efficiency Act; line-item appropriations as part of the NPS budget; participation by the park concessioner; and user charges, which would be collected as part of the entrance fee. The systems would work best if fares were not charged. Direct user charges are not recommended. On a per-visitor basis, many of the alternatives are within the range of $1.50 to $5.00. This funding level could be generated through modest increases in entrance fees. The fixed guideway VTS options in the valley would require funding from sources other than users. Investment in these systems may be considered as a way to better preserve the valley's valuable natural and cultural resources.

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EVALUATION SUMMARY CHART

MARIPOSA GROVE ACCESS ALTERNATIVES

	Goat Meadow Shuttle Staging Area	Wawona Shuttle Staging Area	Grizzly Giant Parking Area
Visitor Transportation and Management	• Increases overall visitor length of stay • Average visitor delay = 24 minutes • Distributes grove visitation equally over time • Concentrates visitors into groups • Reduces vehicular circulation and congestion at south entrance intersection • May require independent Wawona Campground/Hotel shuttle	• Greatest Increase in overall visitor length of stay • Average visitor delay = 36 minutes • Distributes grove visitation equally over time • Concentrates visitors into groups • Reduces vehicular circulation and congestion at south entrance intersection • Intensifies activity in busy Wawona area • Long back-tracking for some trips	• Most direct visitor access to Grove • Average visitor delay = 0 Minutes • Less control over visitor arrival times at grove • Smaller visitor groups • Requires traffic management at south entrance intersection • May require independent Wawona Campground/Hotel shuttle
Visitor Experience	• Less convenient access to grove • Increases perception of crowding in grove • Increases shuttle-related noise in grove • Reduces crowding in Wawona area	• Less convenient access to grove • Increases perception of crowding in grove • Increases shuttle-related noise in grove and on route to Wawona	• Most convenient visitor access to grove • Reduces crowding in Wawona area
Resource Impact	• Space requirements for parking and visitor facilities = 3.3 acres • Increases auto VMT by 620 miles per day • Bus VMT = 1,133 miles per day • Particulate and NO_x emissions would increase • Restores natural habit and decreases soil erosion in lower grove • Soil erosion and habitat disturbance on U.S Forest Service land • Maintenance facility requires 10,700 square feet (s.f.)	• Space requirements for parking and visitor facilities = 4.0 acres • Reduces auto VMT by 3,498 miles per day • Bus VMT = 1,805 miles per day • Particulate and NO_x emissions could increase • Restores natural habit and decreases soil erosion in lower grove • Soil erosion and habitat disturbance on NPS land • Potential staging area sites have meadow, meadow edge or wild and scenic river impacts • Maintenance facility requires 11,671 square feet (s.f.)	• Space requirements for parking and visitor facilities = 2.5 acres • Bus VMT = 381 per day • New development in archeological district • Minimizes development in lower grove • Restores the most natural habitat and decreases soil erosion in lower grove • Requires .75 mile of new road and stream crossing • Staging area located on previously undisturbed land • New maintenance facility not required
Consistency With Park Service and Regional Planning Goals	• Relocates activity development outside park boundary	• Potential traffic, activity and noise impacts to private inholdings • Intensifies activity in Wawona development area	• Previously recommended in draft development concept plan
Cost and Cost Effectiveness	• Higher cost than Grizzly Giant for parking construction, bus fleet and bus operating cost	• Most costly for parking construction, bus fleet and bus operating cost	• Least costly • Operating costs of shuttle could be covered by hotel surcharge
Implementation	• Requires coordination with U.S. Forest Service • Requires relocation of south entrance station • Creates new area for law enforcement and resource protection • May require less extensive environmental documentation • Number of transportation employees = 21	• Relocation of south entrance station recommended • Requires environmental documentation • Number of transportation employees = 25	• Relocation of south entrance station recommended • Requires completion of environmental documentation • Number of transportation employees = 7

EVALUATION SUMMARY CHART

TUOLUMNE MEADOWS CIRCULATOR/TIOGA ROAD ACCESS SHUTTLES ALTERNATIVES

	Designated Staging Area and Mandatory VTS Shuttle Services	**Designated Staging Area and Voluntary VTS Shuttle Services**
Visitor Transportation and Management	◦ Consolidates and simplifies day use visitor parking ◦ Improves access to shuttle by providing designated parking area ◦ Eliminates direct private vehicle access to visitor activity areas ◦ Increases travel distance for visitors from west ◦ Organizes visitor distribution ◦ Reduces pedestrian/traffic conflicts ◦ Reduces traffic circulation	◦ Improves access to shuttle by providing designated parking area ◦ Maintains limited direct private vehicle access to visitor activity areas ◦ May encourage circulation to find parking spaces ◦ Visitor and vehicle activity more dispersed
Visitor Experience	◦ Simplifies parking and access to shuttle system ◦ Reduces visitor confusion and uncertainty ◦ Eliminates visual disruption of parked vehicles in road corridor ◦ Increases access time and walking distances to some locations ◦ Requires transfer of recreational equipment to shuttle for all users	◦ May be more convenient for some visitors ◦ Provides backup parking to primary access points ◦ Requires transfer of recreational equipment to shuttle for some users ◦ Eliminates some visual disruption of parked vehicles in road corridor ◦ May increase access time and walking distances to some locations
Resource Impact	◦ Space requirements for parking and visitor facilities = 7.5 acres ◦ Eliminates habitat, soil erosion, and water quality impacts by removing road edge and trailhead parking ◦ Removes parking from wild and scenic river corridor ◦ Maintenance facility requires 19,770 square feet (s.f.)	◦ Space requirements for parking and visitor facilities = 5.1 acres ◦ Reduces habitat, soil erosion, and water quality impacts by removing road edge and informal trailhead parking ◦ Reduces parking in wild and scenic river corridor ◦ Maintenance facility requires 15,088 square feet (s.f.)
Consistency With Park Service and Regional Planning Goals	◦ Development concept plan planned for area ◦ Reduces wild and scenic river impact	◦ Development concept plan planned for area ◦ Some reduction in wild and scenic river impacts ◦ Lower cost
Cost and Cost Effectiveness	◦ Most costly option	◦ Less costly alternative
Implementation	◦ Simplifies parking and traffic enforcement ◦ Number of transportation employees = 49 ◦ Easiest management of visitor limits	◦ Multiple areas to enforce parking restrictions ◦ Difficult to contain parking in designated activity lots ◦ Number of transportation employees = 39 ◦ Requires promotion to encourage visitor use ◦ Improved management of visitor limits

EVALUATION SUMMARY CHART

YOSEMITE VALLEY VTS ALTERNATIVES

	Bus Transit	**Light Rail Transit**	**Elevated People Mover Transit**
Visitor Transportation and Management	◦ Reduces private vehicle/ VTS conflicts ◦ Maximum route flexibility ◦ Some potential for VTS delays from visitor traffic ◦ Connector wait time = 1.0 minute (standard bus) to 1.5 minutes (articulated bus) ◦ Circulator wait time = 2.0 minutes (standard bus) to 3.0 minutes (articulated bus) ◦ Travel time, Camp 6 - Taft Toe = 10.1 minutes	◦ Major reduction in private vehicle/VTS conflicts ◦ Inflexible alignment ◦ Minor potential for VTS delays at visitor traffic crossings ◦ Connector wait time = 2.5 minutes ◦ Circulator wait time = 3.75 minutes ◦ Travel time, Camp 6 to Taft Toe = 10.1 minutes	◦ Eliminates private vehicle/VTS conflicts ◦ Requires vertical circulation of passengers ◦ Inflexible alignment and stations ◦ No delays from visitor traffic ◦ Connector wait time = 3.0 minutes ◦ Circulator wait time = 5.0 minutes ◦ Travel time, Camp 6 to Taft Toe = 9.3 minutes
Visitor Experience	◦ May increase VTS related noise ◦ Visual impact limited to vehicle presence ◦ Maintains close contact with immediate environment ◦ Frequent vehicle passage along VTS route	◦ System may have novelty appeal to visitors ◦ Reduces VTS-related noise ◦ Overhead power wires may disrupt views from valley floor ◦ Maintains close contact with immediate environment ◦ Noise impacts during construction ◦ Visitor access disrupted during construction	◦ System has strong novelty value ◦ Reduces VTS related noise ◦ Trip time lengthened by station access ◦ Elevated guideway structure will disrupt views from valley floor and Glacier Point ◦ Character may conflict with natural environment ◦ Provides unique viewpoints from elevated guideway ◦ Reduces contact with immediate environment ◦ More difficult to transport recreation equipment ◦ Noise impacts during construction ◦ Visitor access disrupted during construction
Resource Impact	◦ Conventional bus maintenance facility requirements = 35,146 s.f. (could be located outside Valley) ◦ Articulated bus maintenance Facility space requires 30,822 s.f. (could be located outside Valley) ◦ Eliminates VTS traffic from 2.5 miles of road ◦ Increases VTS/wildlife conflicts ◦ Space requirements for parking and visitor facilities = 22.0 acres (at-grade surface parking)	◦ Eliminates VTS emissions ◦ Maintenance facility space requires 44,480 s.f. (must be located in Valley) ◦ Eliminates VTS traffic from 2.5 miles of road ◦ Reduces VTS/wildlife conflicts ◦ Eliminates VTS impact on water quality ◦ May require new river crossing at Sentinel Bridge ◦ May increase transportation corridor width required ◦ Extensive construction in archeological district ◦ Habitat disruption during construction ◦ Space requirements for parking and visitor facilities = 22.0 acres (at-grade surface parking)	◦ Eliminates VTS emissions ◦ Maintenance facility requires 35,430 s.f. (must be located in valley) ◦ Eliminates VTS traffic from all roads ◦ Eliminates VTS/wildlife conflicts ◦ Eliminates VTS impact on water quality ◦ Habitat disruptions at pier locations ◦ Extensive construction in archeological district ◦ Habitat disruption during construction ◦ Space requirements for parking and visitor facilities = 22.0 acres (at-grade surface parking)
Consistency With Park Service and Regional Planning Goals	◦ Reduces vehicle influence in Valley	◦ Major reduction in vehicle influence within valley ◦ Requires new construction within designated wild and scenic river corridor	◦ Major reduction in vehicle influence within valley ◦ Requires new construction within designated wild and scenic river corridor
Cost and Cost Effectiveness	◦ May require additional road repair ◦ Lowest capital cost ◦ Highest operating cost	◦ Very high capital cost ◦ Lower operating cost than standard bus	◦ Highest capital cost ◦ Lowest operating cost
Implementation	◦ Number of transportation employees = 92 (conventional bus) ◦ Number of transportation employees = 66 (articulated bus) ◦ Turnkey implementation possible with existing concessioner System implementation may not require environmental documentation	◦ Number of transportation employees = 47 ◦ Requires some special skills for advanced technology ◦ Requires specialized construction expertise ◦ System implementation would require environmental documentation ◦ Construction crew housing required ◦ Requires existing electrical service to be upgraded	◦ Number of transportation employees = 36 ◦ Requires highly specialized skills for advanced technology ◦ Requires specialized construction expertise ◦ System implementation would require environmental documentation ◦ Construction crew housing required ◦ Requires existing electrical service to be upgraded

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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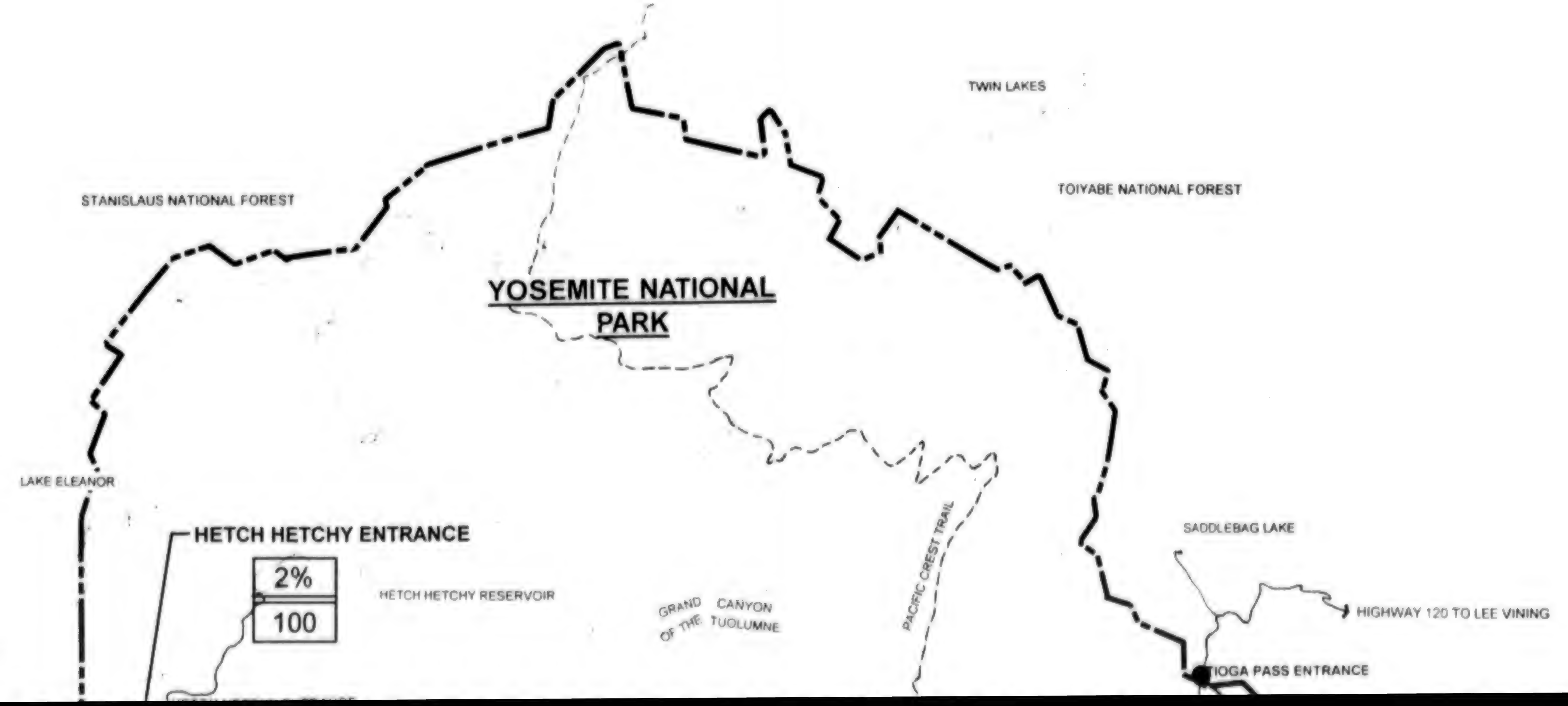
United States Department of the Interior • National Park Service

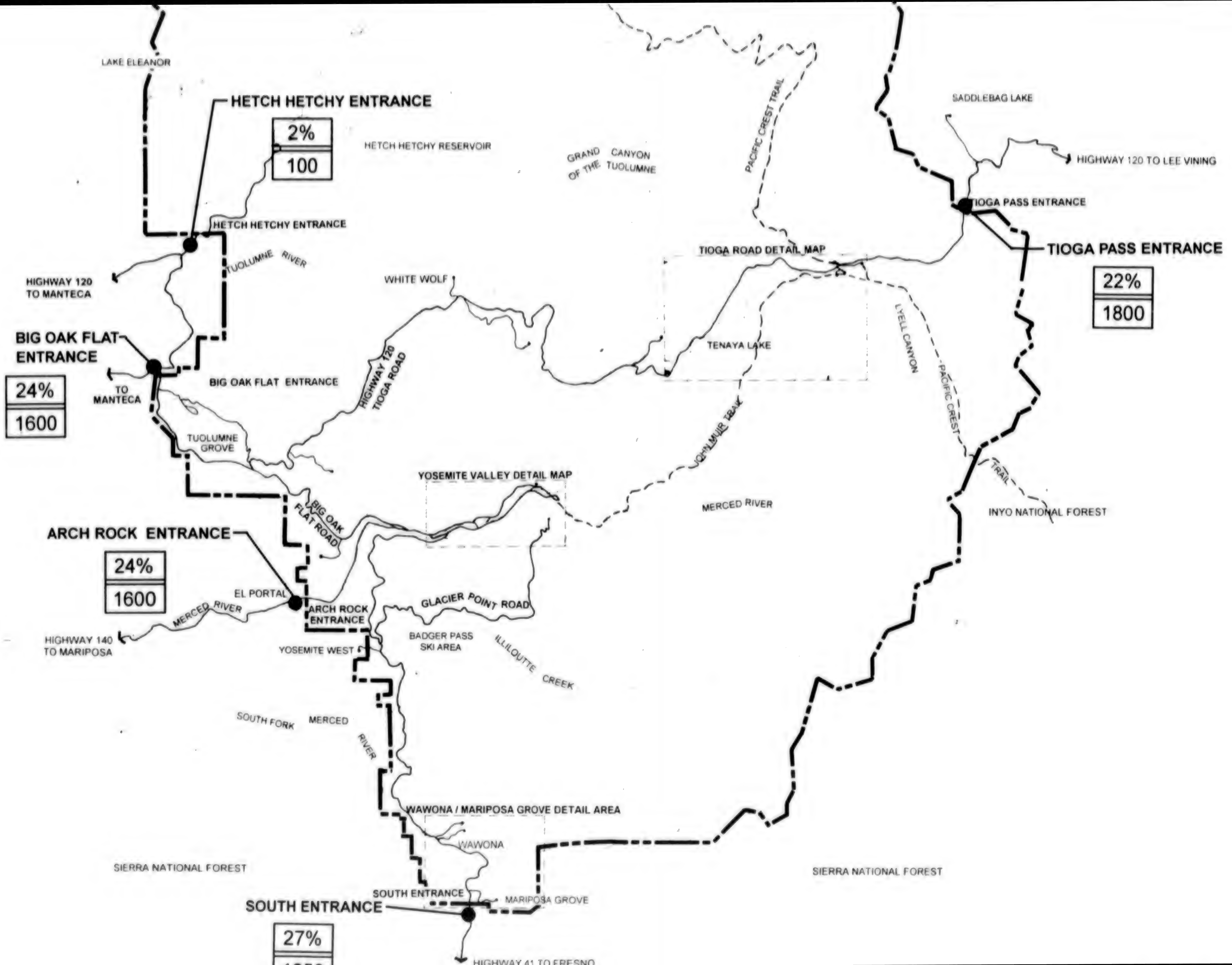
END

DATE FILMED

11/08/96

PROPORTIONS OF PEAK SEASON VEHICLE ENTRIES





LEGEND:

10%	1992 PEAK SEASON PERCENTAGES (MAY - SEPTEMBER)
1000	1992 AVERAGE DAILY VEHICLE ENTRIES FOR AUGUST

SOURCE: MONTHLY PUBLIC USE REPORTS

0 1 5 10 MILES

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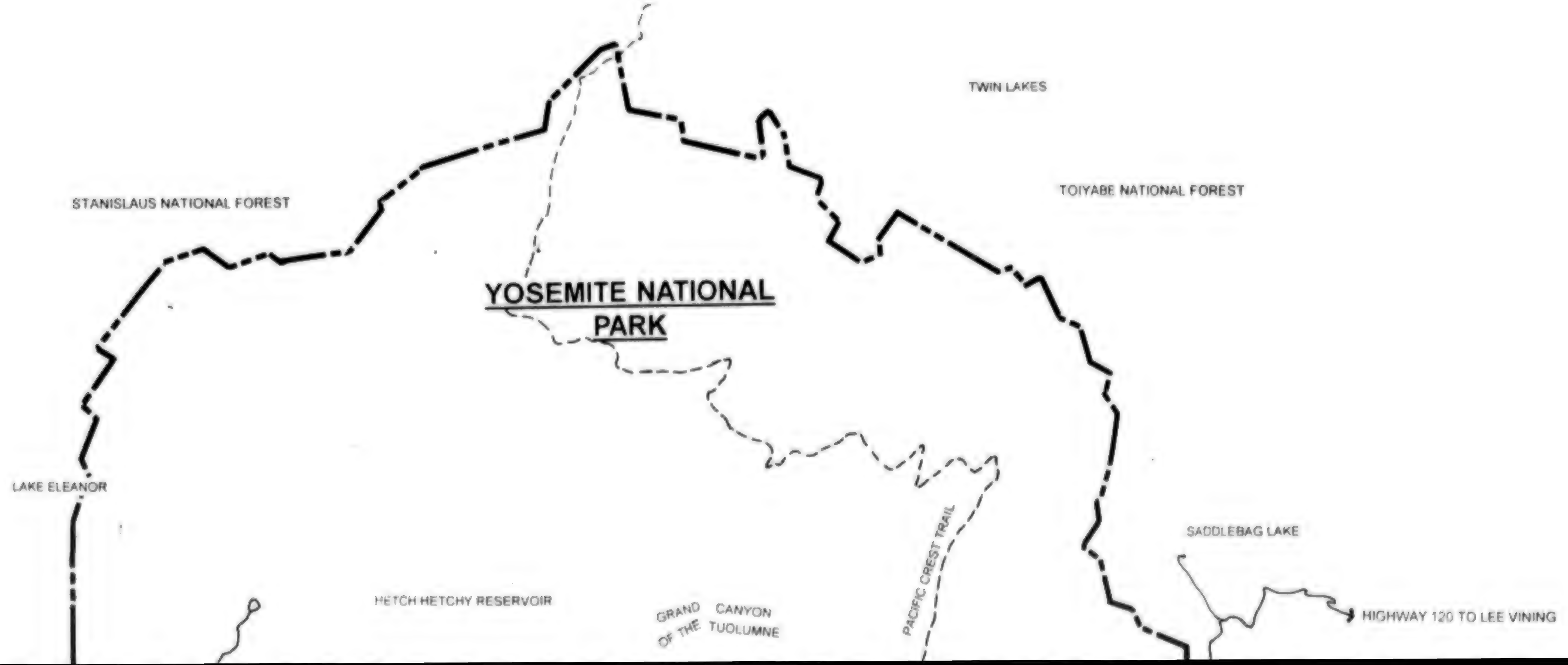
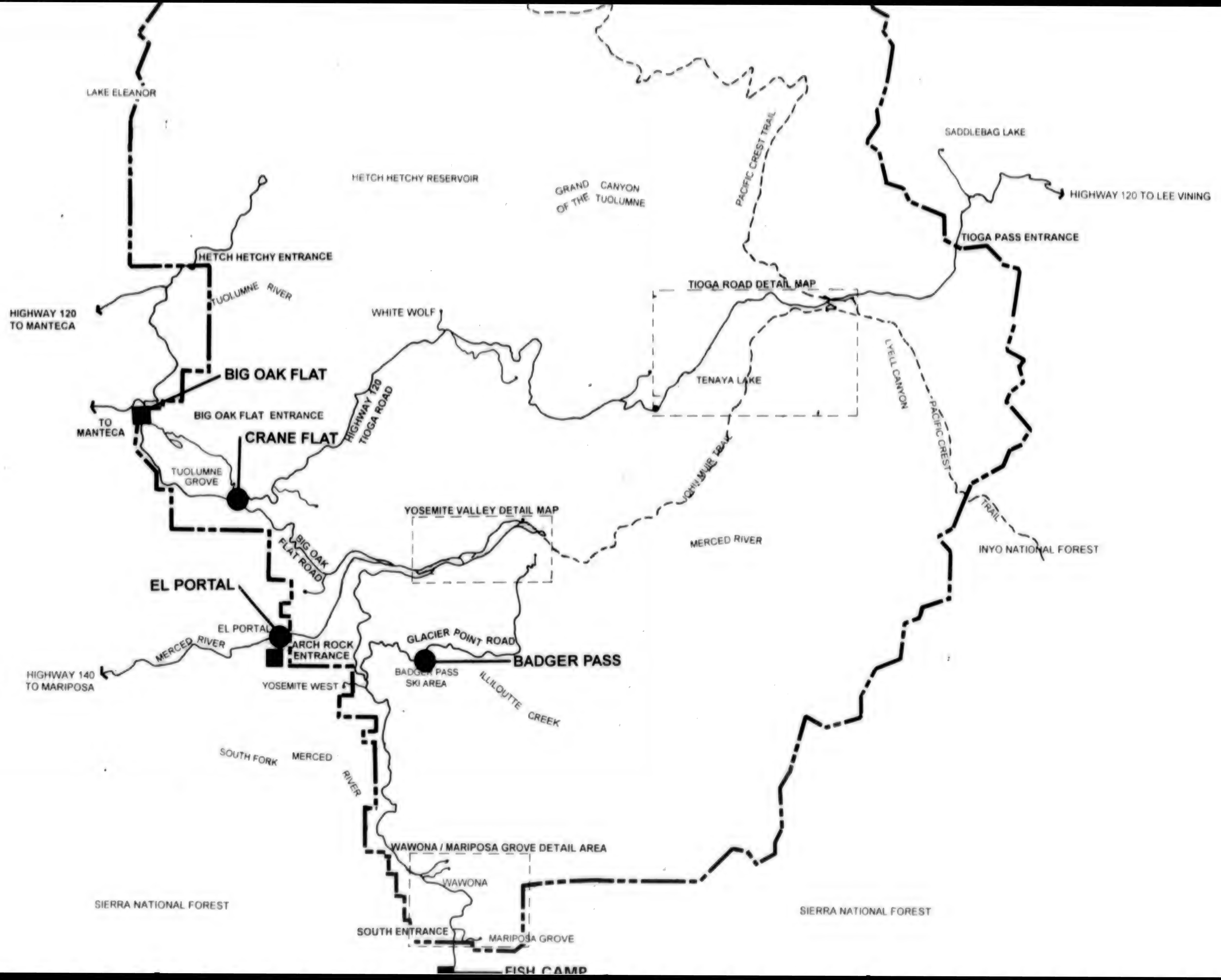
POTENTIAL REMOTE VALLEY STAGING AREAS

LEGEND:

● **REMOTE IN-PARK STAGING AREAS** (El Portal also included in this category)

■ **STAGING AREAS OUTSIDE PARK**





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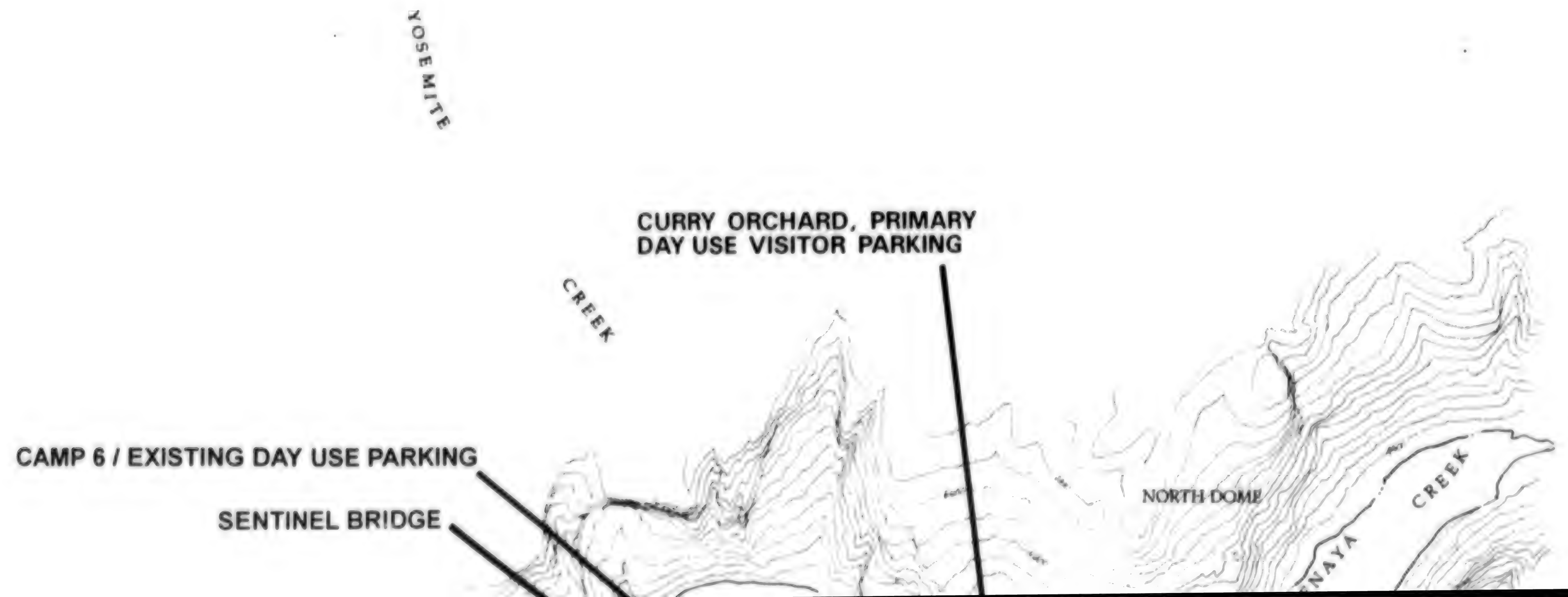
YOSEMITE VALLEY STAGING OPTIONS


YOSEMITE
CREEK
CURRY ORCHARD, PRIMARY DAY USE VISITOR PARKING
CAMP 6 / EXISTING DAY USE PARKING
SENTINEL BRIDGE
NORTH DOME
CREEK

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ALTERNATIVE TRANSPORTATION MODES FEASIBILITY STUDY

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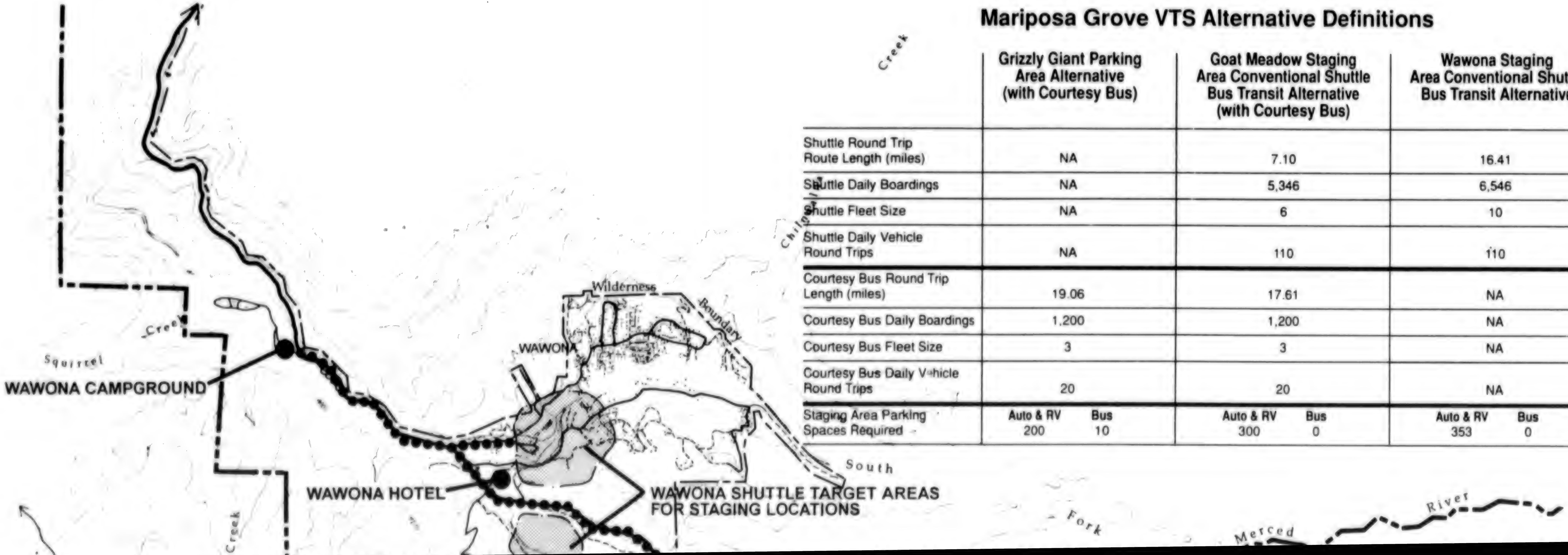
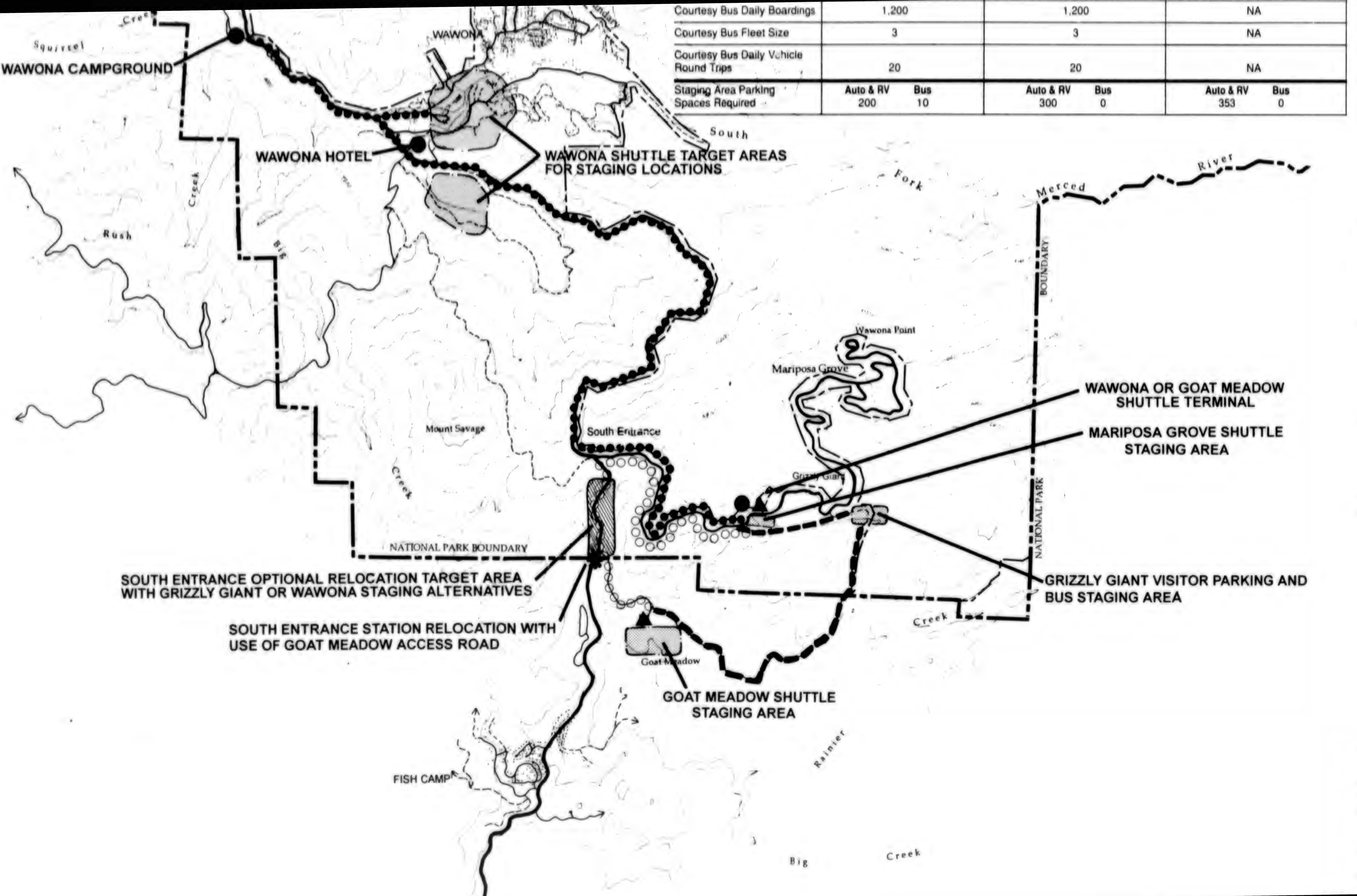
MARIPOSA GROVE ACCESS ALTERNATIVES



Mariposa Grove VTS Alternative Definitions

	Grizzly Giant Parking Area Alternative (with Courtesy Bus)	Goat Meadow Staging Area Conventional Shuttle Bus Transit Alternative (with Courtesy Bus)	Wawona Staging Area Conventional Shuttle Bus Transit Alternative
Shuttle Round Trip Route Length (miles)	NA	7.10	16.41
Shuttle Daily Boardings	NA	5,346	6,546
Shuttle Fleet Size	NA	6	10
Shuttle Daily Vehicle Round Trips	NA	110	110
Courtesy Bus Round Trip Length (miles)	19.06	17.61	NA
Courtesy Bus Daily Boardings	1,200	1,200	NA
Courtesy Bus Fleet Size	3	3	NA
Courtesy Bus Daily Vehicle Round Trips	20	20	NA
Staging Area Parking Spaces Required	Auto & RV 200 Bus 10	Auto & RV 300 Bus 0	Auto & RV 353 Bus 0

Courtesy Bus Daily Boardings	1,200	1,200	NA
Courtesy Bus Fleet Size	3	3	NA
Courtesy Bus Daily Vehicle Round Trips	20	20	NA
Staging Area Parking Spaces Required	Auto & RV 200 Bus 10	Auto & RV 300 Bus 0	Auto & RV 353 Bus 0


WAWONA CAMPGROUND
WAWONA
Squirrel Creek
WAWONA HOTEL
WAWONA SHUTTLE TARGET AREAS FOR STAGING LOCATIONS
South Fork Merced River
Rush Creek
Big Creek
BOUNDARY
NATIONAL PARK
Wawona Point
Mariposa Grove
WAWONA OR GOAT MEADOW SHUTTLE TERMINAL
MARIPOSA GROVE SHUTTLE STAGING AREA
Mount Savage
South Entrance
Creek
Grizzly Giant
NATIONAL PARK BOUNDARY
SOUTH ENTRANCE OPTIONAL RELOCATION TARGET AREA WITH GRIZZLY GIANT OR WAWONA STAGING ALTERNATIVES
SOUTH ENTRANCE STATION RELOCATION WITH USE OF GOAT MEADOW ACCESS ROAD
GRIZZLY GIANT VISITOR PARKING AND BUS STAGING AREA
Creek
Goat Meadow
GOAT MEADOW SHUTTLE STAGING AREA
Rainier
FISH CAMP
Big Creek

LEGEND:

- GRIZZLY GIANT PARKING ALTERNATIVE; OPTIONAL ROADWAY ALIGNMENTS
- GOAT MEADOW STAGING ALTERNATIVE SHUTTLE ALIGNMENT
- ▲ GOAT MEADOW SHUTTLE STOPS
- WAWONA STAGING ALTERNATIVE SHUTTLE ALIGNMENT
- ● WAWONA SHUTTLE STOPS

NOTES:
1. Separate Courtesy Shuttle Provided for Wawona Campground and Wawona Hotel Guests with Goat Meadow Staging or Grizzly Giant Parking Alternatives.
2. Tour Buses Maintain Direct Access to Mariposa Grove under each Alternative.

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TUOLUMNE MEADOWS CIRCULATOR/TIOGA ROAD ACCESS SHUTTLES ALTERNATIVE

Toulumne Meadows VTS Alternative Definitions

	Mandatory Low Floor Shuttle Bus Transit Alternative		Voluntary Low Floor Shuttle Bus Transit Alternative	
Meadows Circulator Round Trip Route Length (miles)	13.26		13.26	
Meadows Circulator Daily Access and Egress Boardings*	4,624		3,604	
Meadows Circulator Fleet Size	10		8	
Meadows Circulator Daily Vehicle Round Trips	100		70	
Tioga Access Round Trip Route Length (miles)	28.03		28.03	
Tioga Access Daily Access and Egress Boardings*	3,082		2,402	
Tioga Access Fleet Size	8		7	
Tioga Access Daily Vehicle Round Trips	65		50	
Staging Area Parking Spaces Required	Auto & RV 659	Bus 5	Auto & RV 444	Bus 5

* Assumes two boardings per visitor. Additional linked trips may occur.

Tioga Access Round Trip Route Length (miles)	28.03	28.03
Tioga Access Daily Access and Egress Boardings *	3,082	2,402
Tioga Access Fleet Size	8	7
Tioga Access Daily Vehicle Round Trips	65	50
Staging Area Parking Spaces Required	Auto & RV 659 Bus 5	Auto & RV 444 Bus 5

* Assumes two boardings per visitor. Additional linked trips may occur.

POTHOLE DOME ACCESS
TO OLMSTED POINT
POTHOLE DOME
LEMBERT DOME
EXISTING TUOLUMNE STABLES
SODA SPRINGS TRAILHEAD (East)
Dog Lake
Delaney
Creek
LEMBERT DOME
TUOLUMNE MEADOWS
EXISTING GRAVEL PIT
TUOLUMNE MEADOWS AND TIOGA ROAD SHUTTLES STAGING AREA (potential relocation site for Tuolumne Meadows visitor services)
Wilderness Boundary
TIOGA ROAD
TUOLUMNE LODGE
DOG LAKE TRAILHEAD
WILDERNESS PERMIT OFFICE
TUOLUMNE RIVER
TIOGA ROAD
Wilderness Boundary
John Muir Trail
CATHEDRAL LAKES AND JOHN MUIR TRAILHEAD
TUOLUMNE CAMPGROUND REGISTRATION OFFICE AND EXISTING VISITOR SERVICES
TUOLUMNE CAMPGROUND, (west end)
SODA SPRINGS TRAILHEAD (West)
Crest Scenic Trail
John Muir Trail
EXISTING VISITOR CENTER
Unicorn Creek
Budd Creek
Rafferty Creek
UNICORN PEAK
Elizabeth Lake
LEGEND:
TUOLUMNE MEADOWS CIRCULATOR AND TIOGA ROAD ACCESS SHUTTLE ROUTES
TUOLUMNE MEADOWS CIRCULATOR SHUTTLE ROUTE ONLY
● TUOLUMNE MEADOWS CIRCULATOR SHUTTLE STOPS
TIOGA ROAD ACCESS SHUTTLE ROUTE ONLY
▲ TIOGA ROAD ACCESS SHUTTLE STOPS
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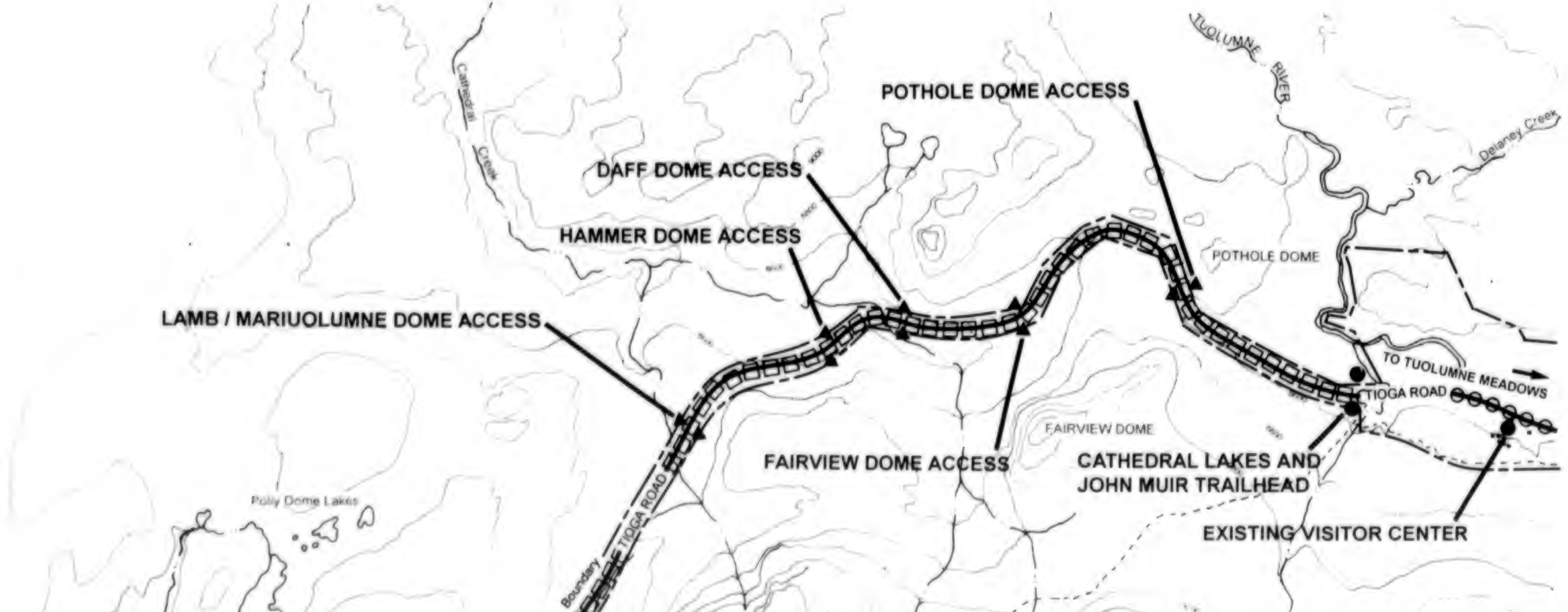
TIOGA ROAD ACCESS/ TUOLUMNE MEADOWS CIRCULATOR SHUTTLES ALTERNATIVE



TO TUOLUMNE MEADOWS
TIOGA ROAD
FAIRVIEW DOME
FAIRVIEW DOME ACCESS
CATHEDRAL LAKES AND JOHN MUIR TRAILHEAD
EXISTING VISITOR CENTER
Polly Dome Lakes
TIOGA ROAD
Wilderness Boundary
MEDLICOTT DOME / FISHERMAN'S TRAIL ACCESS
LOW PROFILE DOME ACCESS
MEDLICOTT DOME
Murphy Creek
POLLY DOME
John Muir Trail
Budd Creek
PHOBOS CLIFF / PYWIACK DOME ACCESS
PYWIACK DOME
CATHEDRAL PEAK
TENAYA LAKE PICNIC AREA
MAIN PYWIACK DOME ACCESS
MURPHY CREEK TRAILHEAD
Cathedral Lakes
Budd Lake
Tenaya Creek
TENAYA LAKE
TENAYA PEAK
SUNRISE LAKES TRAILHEAD
Mildred Lake
Wilderness Boundary
OLMSTED POINT
LEGEND:
TIOGA ROAD ACCESS SHUTTLE ROUTE ONLY
TIOGA ROAD ACCESS SHUTTLE STOPS
TUOLUMNE MEADOWS CIRCULATOR AND TIOGA ROAD ACCESS SHUTTLE ROUTES
TUOLUMNE MEADOWS CIRCULATOR SHUTTLE STOPS
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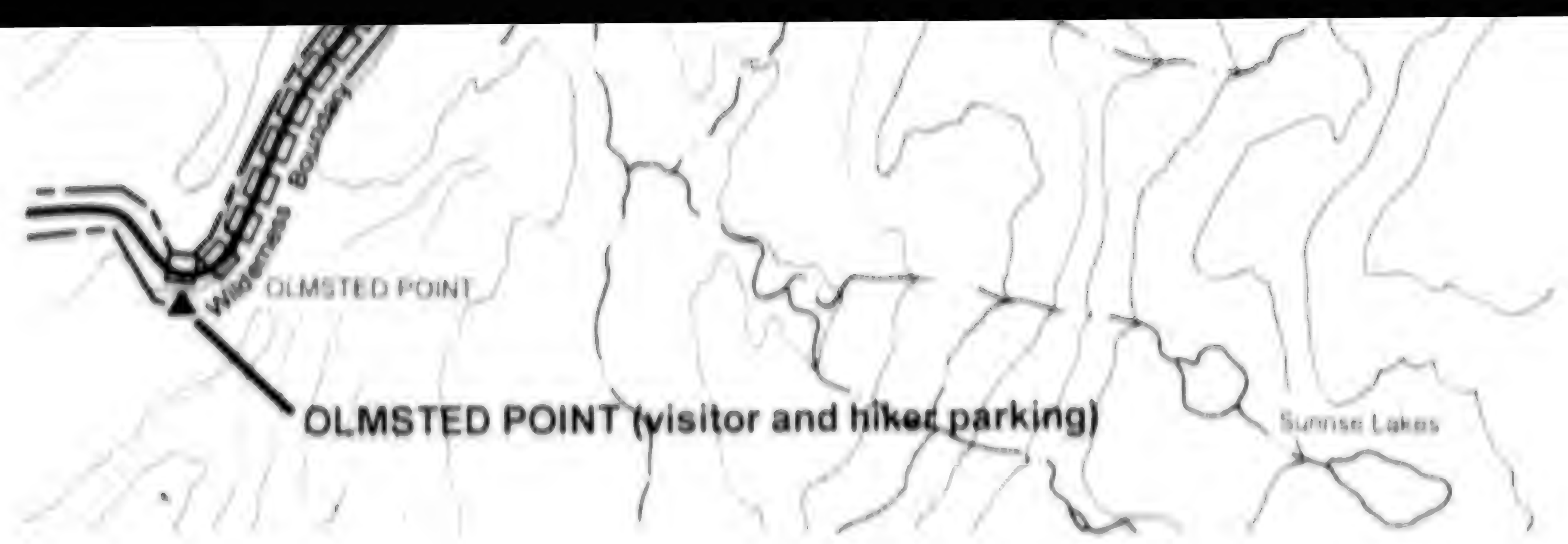

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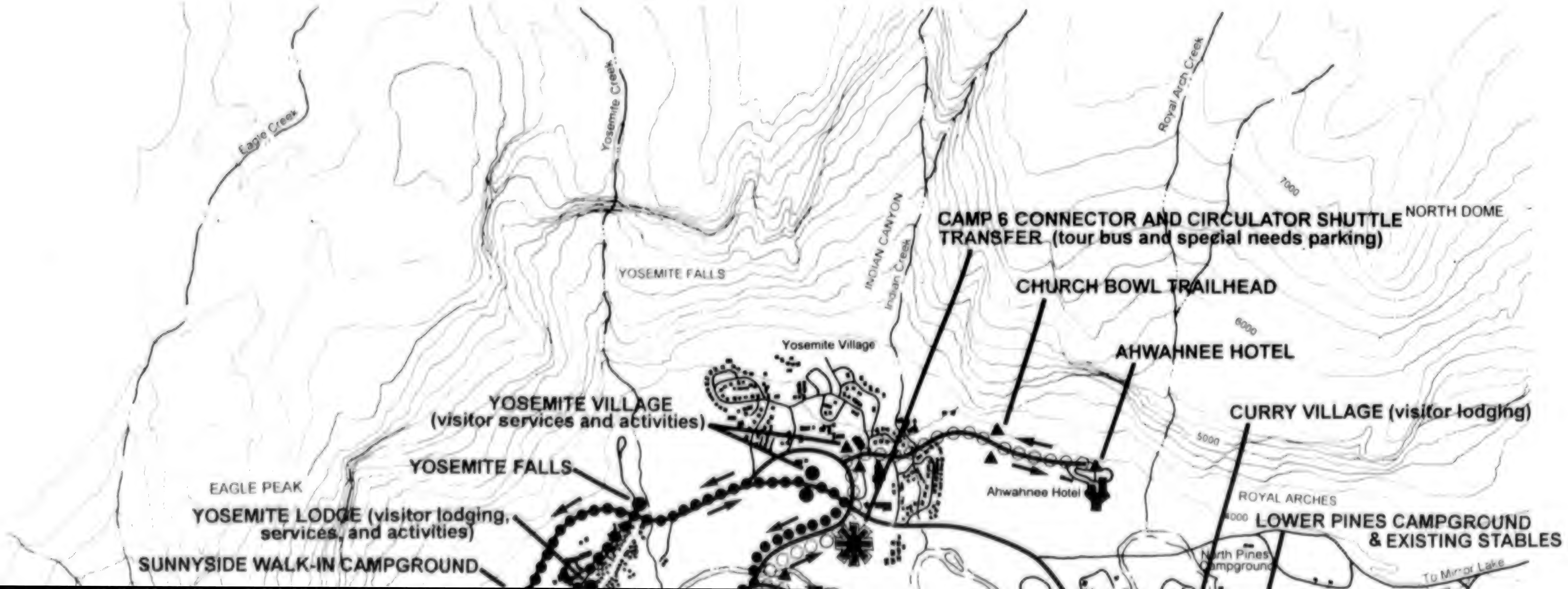
YOSEMITE VALLEY VTS ALTERNATIVE


Eagle Creek
Yosemite Creek
Royal Arch Creek
7000
NORTH DOME
CAMP 6 CONNECTOR AND CIRCULATOR SHUTTLE TRANSFER (tour bus and special needs parking)
INDIAN CANYON
Indian Creek
YOSEMITE FALLS
CHURCH BOWL TRAILHEAD
6000
Yosemite Village
AHWAHNEE HOTEL
YOSEMITE VILLAGE (visitor services and activities)
CURRY VILLAGE (visitor lodging)
5000
YOSEMITE FALLS
Ahwahnee Hotel
EAGLE PEAK
ROYAL ARCHES
YOSEMITE LODGE (visitor lodging, services, and activities)
4000
LOWER PINES CAMPGROUND & EXISTING STABLES
North Pines Campground
SUNNYSIDE WALK-IN CAMPGROUND
To Mirror Lake

AHWAHNEE HOTEL
Yosemite Village
YOSEMITE VILLAGE (visitor services and activities)
CURRY VILLAGE (visitor lodging)
YOSEMITE FALLS
EAGLE PEAK
Ahwahnee Hotel
ROYAL ARCHES
YOSEMITE LODGE (visitor lodging, services, and activities)
LOWER PINES CAMPGROUND & EXISTING STABLES
SUNNYSIDE WALK-IN CAMPGROUND
North Pines Campground
To Mirror Lake
Upper River Campground
Group Camp
Lower River Campground
Sunnyside Campground
Yosemite Lodge
Housekeeping Camp
Pines Campground
Stables
THREE BROTHERS
UPPER PINES, RELOCATED RIVERSIDE, GROUP CAMP, AND NORTH PINES CAMPGROUNDS
Curry Village
HOUSEKEEPING CAMP AND LE CONTE MEMORIAL
Upper Pines Campground
YOSEMITE CHAPEL, SENTINEL BRIDGE
CURRY VILLAGE (visitor services)
SWINGING BRIDGE PICNIC AREA
EL CAPITAN
Happy Isles
GLACIER POINT
To Bridalveil Falls
TO POHONO BRIDGE
MERCED RIVER
FOUR MILE TRAILHEAD, SENTINEL BEACH AND YELLOW PINE PICNIC AREAS
HAPPY ISLES NATURE CENTER
SENTINEL DOME
TAFT TOE STAGING AREA AND VISITOR INFORMATION
PROFILE CLIFF
CATHEDRAL SPIRES
4000
5000
6000
7000
LEGEND:
YOSEMITE VALLEY CONNECTOR SHUTTLE ROUTE
CONNECTOR SHUTTLE STOPS
YOSEMITE VALLEY CIRCULATOR SHUTTLE ROUTE
CIRCULATOR SHUTTLE STOPS
0
1000
2000
4000 FEET
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NOTE: VTS Alternatives Include Bus, Light Rail, and Elevated People Mover Technologies.

Yosemite Valley VTS Alternative Definition

	Conventional & Low Floor Shuttle Bus Transit Alternative	Articulated Shuttle Bus Transit Alternative	Light Rail Transit Alternative	Elevated People Mover Transit Alternative
Connector Round Trip Route Length	8.33	8.33	8.33	8.33
Connector Daily Access and Egress Boardings*	18,174	18,174	18,174	18,174
Connector Fleet Size	21	15	9	7
Connector Daily Vehicle Round Trips	390	260	156	136
Circulator Round Trip Route Length	6.82	6.82	6.82	6.82
Circulator Daily Access and Egress Boardings*	24,000	24,000	24,000	24,000
Circulator Fleet Size	11	8	7	5

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Connector Fleet Size	21	15	9	7
Connector Daily Vehicle Round Trips	390	260	156	136
Circulator Round Trip Route Length	6.82	6.82	6.82	6.82
Circulator Daily Access and Egress Boardings*	24,000	24,000	24,000	24,000
Circulator Fleet Size	11	8	7	5
Circulator Daily Vehicle Round Trips	240	160	128	96
Staging Area Parking Spaces Required	Auto & RV 1,844 Bus 20	Auto & RV 1,844 Bus 20	Auto & RV 1,844 Bus 20	Auto & RV 1,844 Bus 20

* Assumes two boardings per visitor. Additional linked trips may occur.

0 1000 2000 4000 FEET

N

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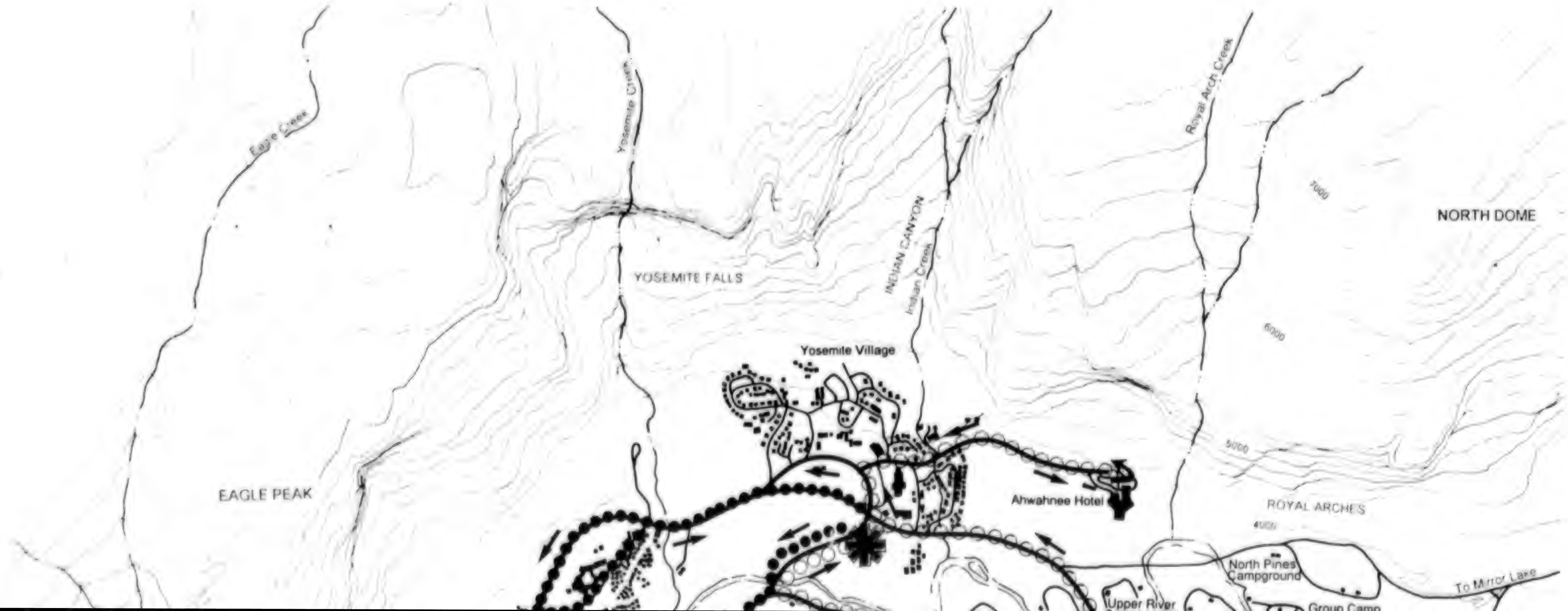
YOSEMITE VALLEY VTS-STAGE I



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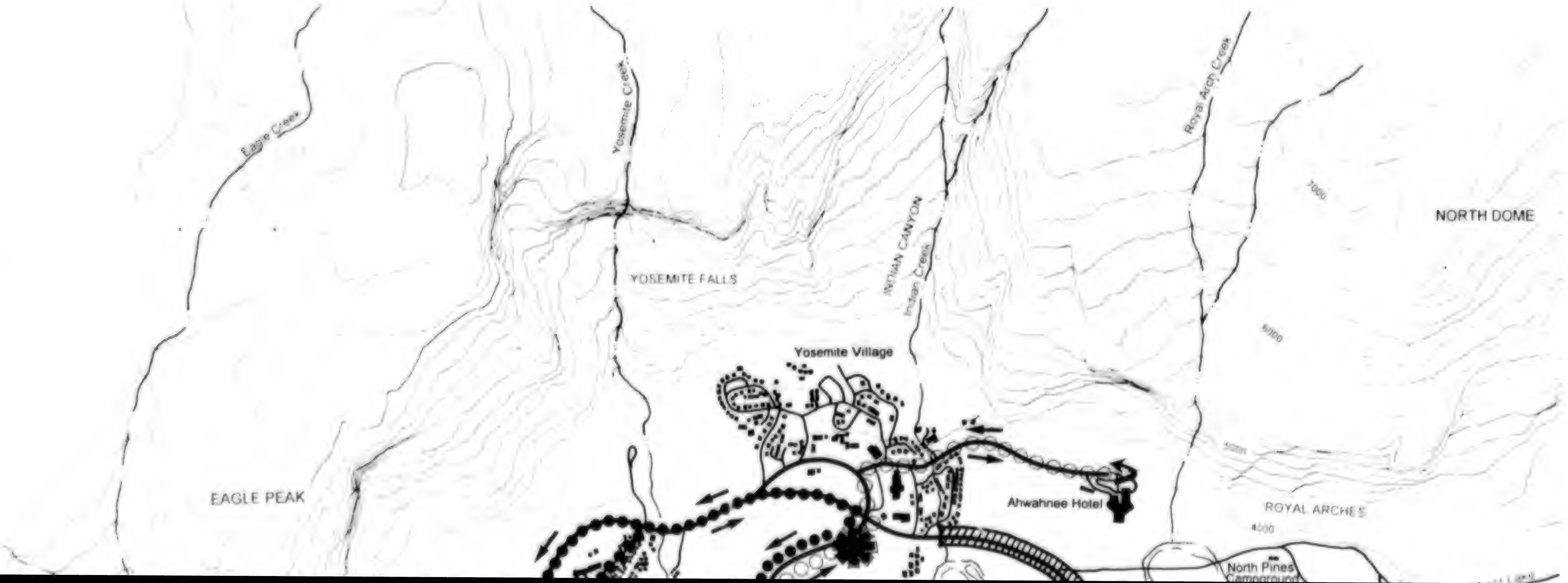
YOSEMITE VALLEY VTS-STAGE II



Yosemite Village
Ahwahnee Hotel
EAGLE PEAK
ROYAL ARCHES
North Pines Campground
Group Camp
To Mirror Lake
Upper River Campground
Lower River Campground
Pines Campground
Stables
Sunnyside Campground
Yosemite Lodge
Housekeeping Camp
THREE BROTHERS
Curry Village
Upper Pines Campground
1
Happy Isles
EL CAPITAN
GLACIER POINT
To Bridalveil Falls
MERCED RIVER
SENTINEL DOME
TAFT TOE
PROFILE CLIFF
CATHEDRAL SPIRES
Illilouette Creek
LEGEND:
VALLEY CIRCULATOR SHUTTLE
VALLEY CONNECTOR
INTERMODAL TRANSFER AT CAMP 6.
CLOSE STONEMAN BRIDGE ROAD TO VEHICULAR TRAFFIC.
1
RELOCATE UPPER AND LOWER RIVERSIDE CAMPS TO UPPER PINES CAMP AREA(WEST SIDE).
0
1000
2000
4000 FEET
N

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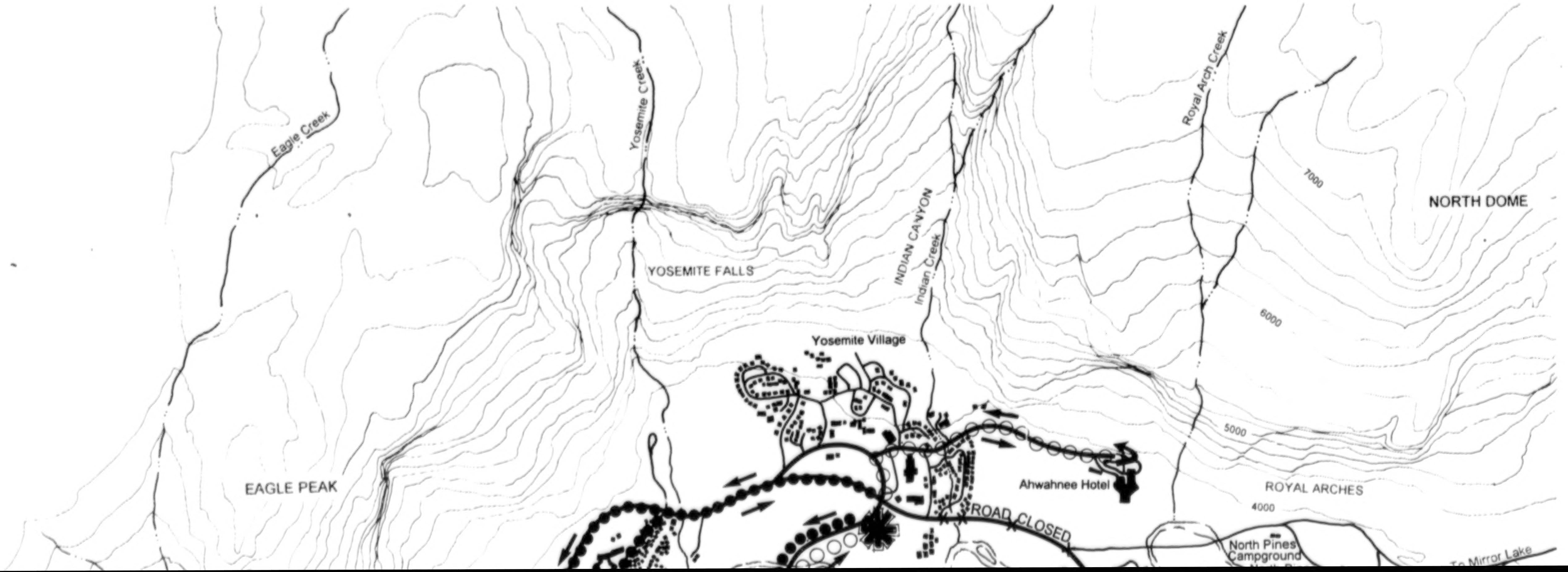

YOSEMITE VALLEY VTS-STAGE III

LEGEND:

○○○○ VALLEY CIRCULATOR SHUTTLE

●●●● VALLEY CONNECTOR ON EXISTING ROAD ALIGNMENT

– – – OPTIONAL VALLEY CONNECTOR ALIGNMENT

✱ INTERMODAL TRANSFER AT CAMP 6.

LEGEND:

- ○○○○○ VALLEY CIRCULATOR SHUTTLE
- ●●●●● VALLEY CONNECTOR ON EXISTING ROAD ALIGNMENT
- — — — OPTIONAL VALLEY CONNECTOR ALIGNMENT
- ✱ INTERMODAL TRANSFER AT CAMP 6.
- ▨ ELIMINATE VISITOR VEHICULAR TRAFFIC ON NORTHSIDE DRIVE BETWEEN POHONO BRIDGE TO EL CAP CROSSOVER. PROVIDE EL CAPITAN VIEWING AND CLIMBER PARKING ACCESS.
- ▬ WIDEN SOUTHSIDE DRIVE AS MAJOR ACCESS TO VALLEY FROM WEST BETWEEN POHONO BRIDGE CROSSING AND TAFT TOE STAGING AREA.
- 1 RELOCATE STABLES.
- 2 RELOCATE NORTH PINES AND GROUP CAMPS TO UPPER PINES CAMP AREA.
- ▨ ELIMINATE SHUTTLE CIRCULATION NORTHEAST OF NATURE CENTER AND ON HAPPY ISLES AND CLARKS BRIDGES.

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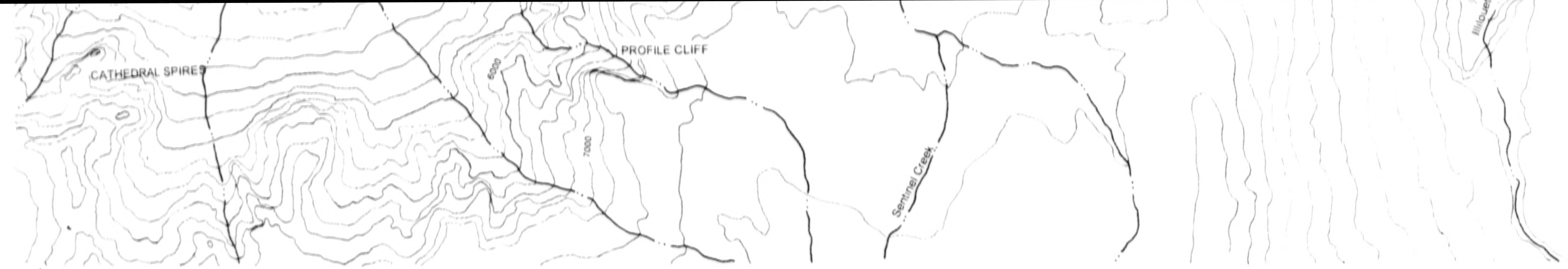

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